US012443667B2

(12) **United States Patent**
Yushkina et al.

(10) **Patent No.: US 12,443,667 B2**
(45) **Date of Patent: Oct. 14, 2025**

(54) **CONTEXTUAL SEARCH TOOL IN A BROWSER INTERFACE**

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(73) Assignee: **GOOGLE LLC**, Mountain View, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 72 days.

(21) Appl. No.: **18/598,843**

(22) Filed: **Mar. 7, 2024**

(65) **Prior Publication Data**

US 2024/0281481 A1 Aug. 22, 2024

Related U.S. Application Data

(63) Continuation of application No. PCT/US2024/016955, filed on Feb. 22, 2024.
(Continued)

(51) **Int. Cl.**
G06F 16/9532 (2019.01)
G06F 9/445 (2018.01)
G06F 16/957 (2019.01)

(52) **U.S. Cl.**
CPC ***G06F 16/9532*** (2019.01); ***G06F 9/44526*** (2013.01); ***G06F 16/9574*** (2019.01)

(58) **Field of Classification Search**
CPC G06F 16/9532; G06F 16/9574; G06F 9/44526
(Continued)

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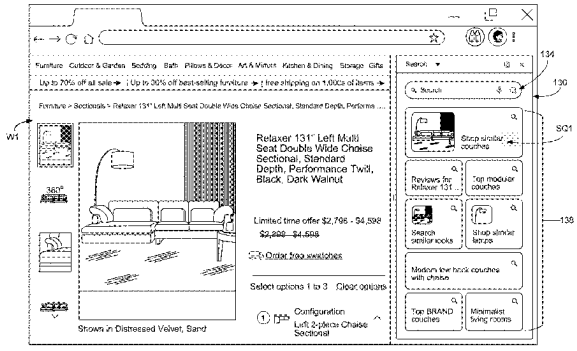
Primary Examiner — Robert Stevens
(74) *Attorney, Agent, or Firm* — Brake Hughes Bellermann LLP

(57) **ABSTRACT**

A browser-based tool is disclosed for providing context-based assistance during web browsing. An example method involves receiving a contextual search request pertaining to main content displayed in a browser's display area, extracting content from the main content, receiving a contextual suggestion based on the extracted content, and displaying the contextual suggestion in a designated contextual search area within the browser. This innovative approach stream-
(Continued)



lines the search process by providing users with relevant suggestions based on the content they are currently viewing, thereby improving efficiency in navigating online information.

25 Claims, 19 Drawing Sheets

Related U.S. Application Data

(60) Provisional application No. 63/486,451, filed on Feb. 22, 2023.

(58) **Field of Classification Search**
USPC 707/708
See application file for complete search history.

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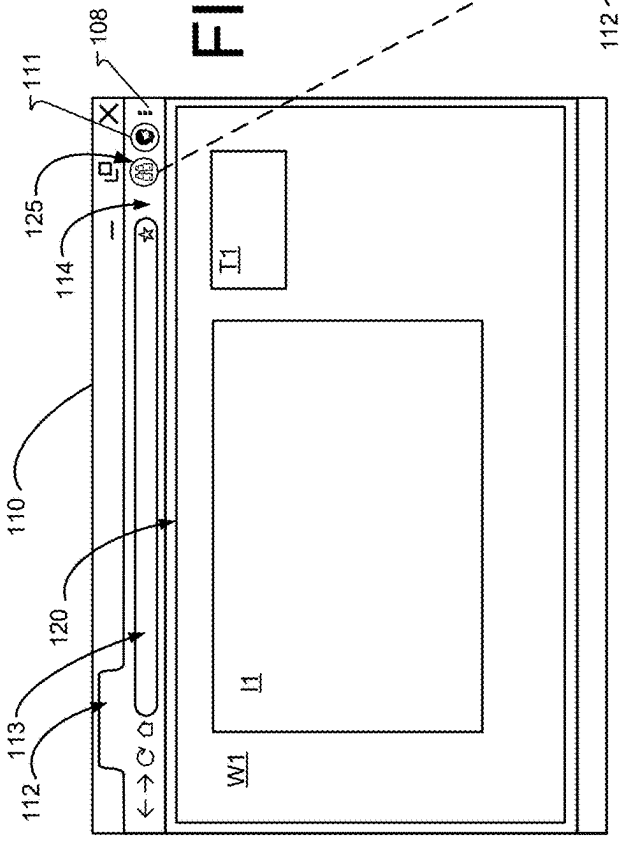
108
111
125
114
110
120
113
112
T1
I1
W1

FIG. 1A

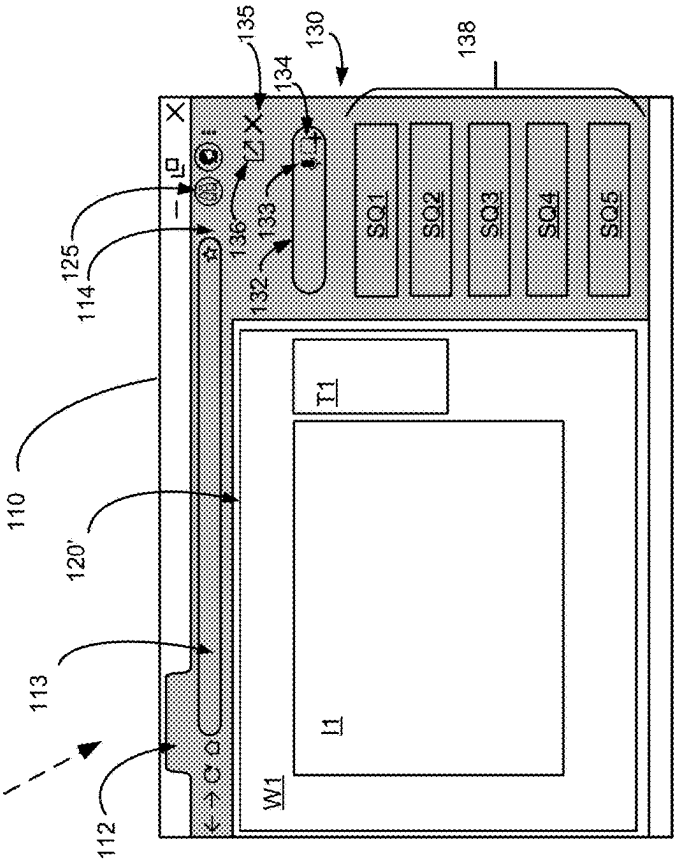
135
134
130
138
125
114
136
133
132
110
120'
113
112
SQ1
SQ2
SQ3
SQ4
SQ5
T1
I1
W1

FIG. 1B

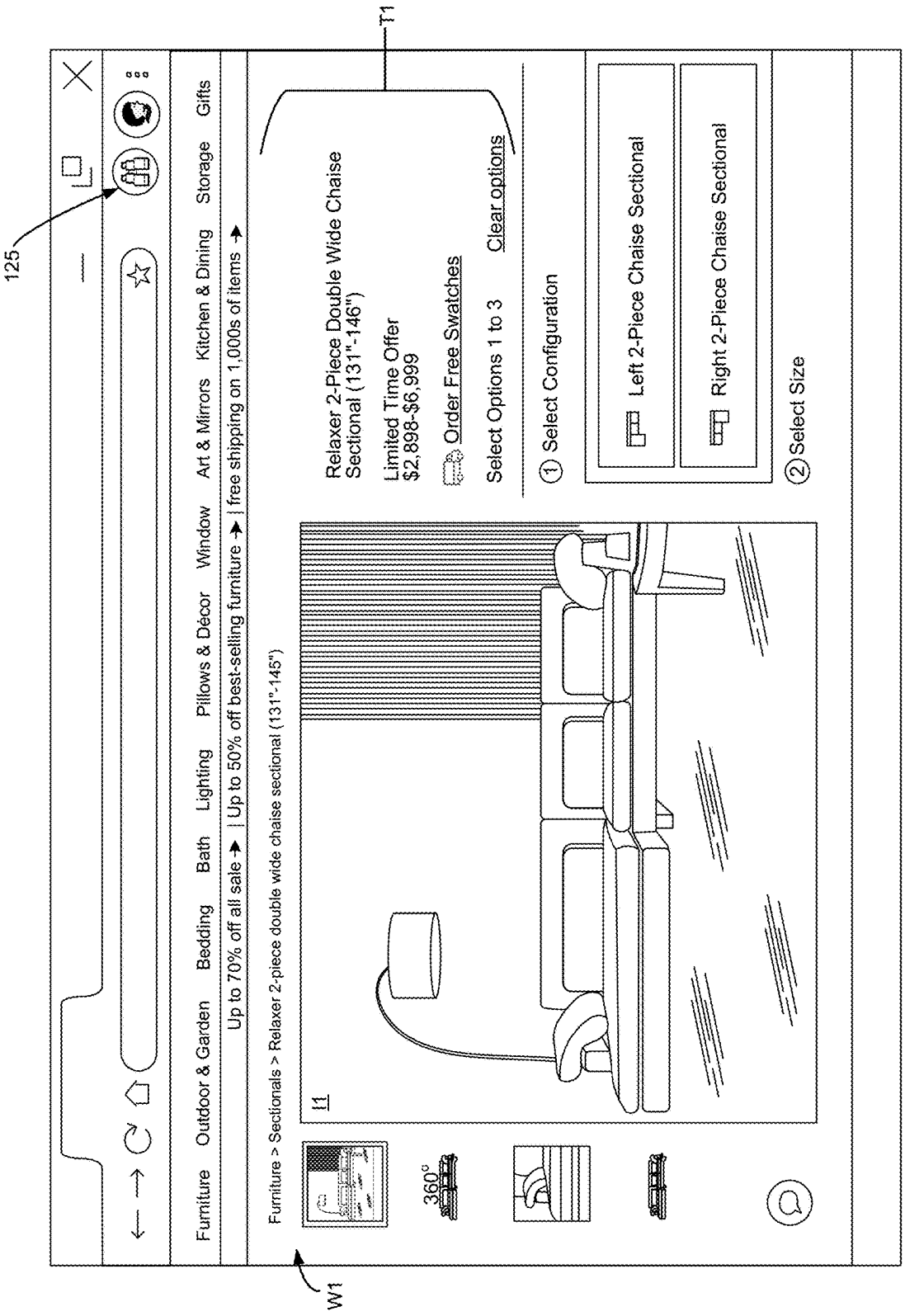
125
T1
W1
Furniture
Outdoor & Garden
Bedding
Bath
Lighting
Pillows & Décor
Window
Art & Mirrors
Kitchen & Dining
Storage
Gifts
Up to 70% off all sale → | Up to 50% off best-selling furniture → | free shipping on 1,000s of items →
Furniture > Sectionals > Relaxer 2-piece double wide chaise sectional (131"-145")
I1
360°
Relaxer 2-Piece Double Wide Chaise Sectional (131"-146")
Limited Time Offer
$2,898-$6,999
Order Free Swatches
Select Options 1 to 3
Clear options
① Select Configuration
Left 2-Piece Chaise Sectional
Right 2-Piece Chaise Sectional
② Select Size

FIG. 1C

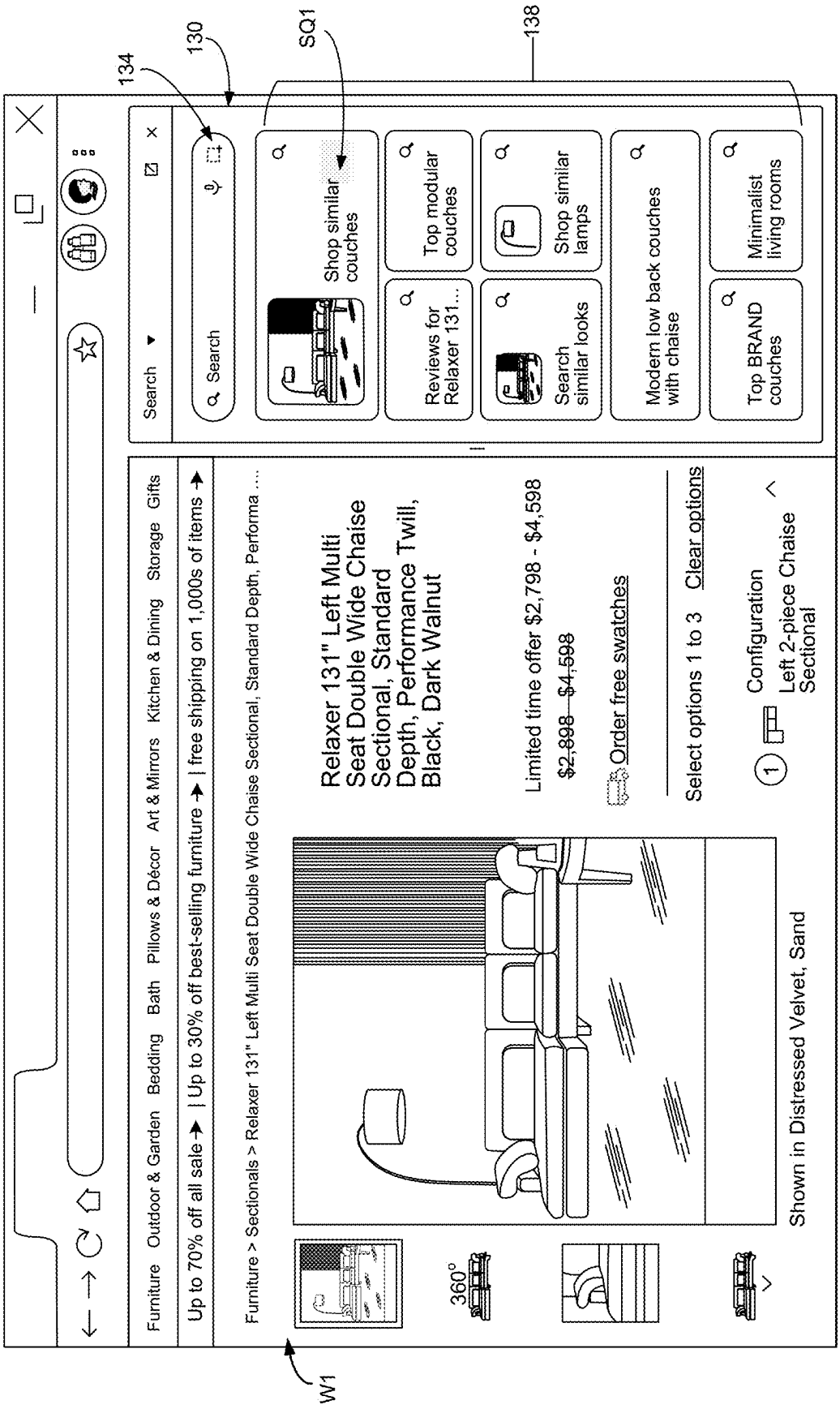
134
130
SQ1
138
Search
Search
Shop similar couches
Top modular couches
Reviews for Relaxer 131...
Shop similar lamps
Search similar looks
Modern low back couches with chaise
Top BRAND couches
Minimalist living rooms
Furniture Outdoor & Garden Bedding Bath Pillows & Décor Art & Mirrors Kitchen & Dining Storage Gifts
Up to 70% off all sale | Up to 30% off best-selling furniture | free shipping on 1,000s of items
Furniture > Sectionals > Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performa ...
Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performance Twill, Black, Dark Walnut
Limited time offer $2,798 - $4,598
$2,898 $4,598
Order free swatches
Select options 1 to 3 Clear options
Configuration
Left 2-piece Chaise Sectional
360°
Shown in Distressed Velvet, Sand
W1

FIG. 1D

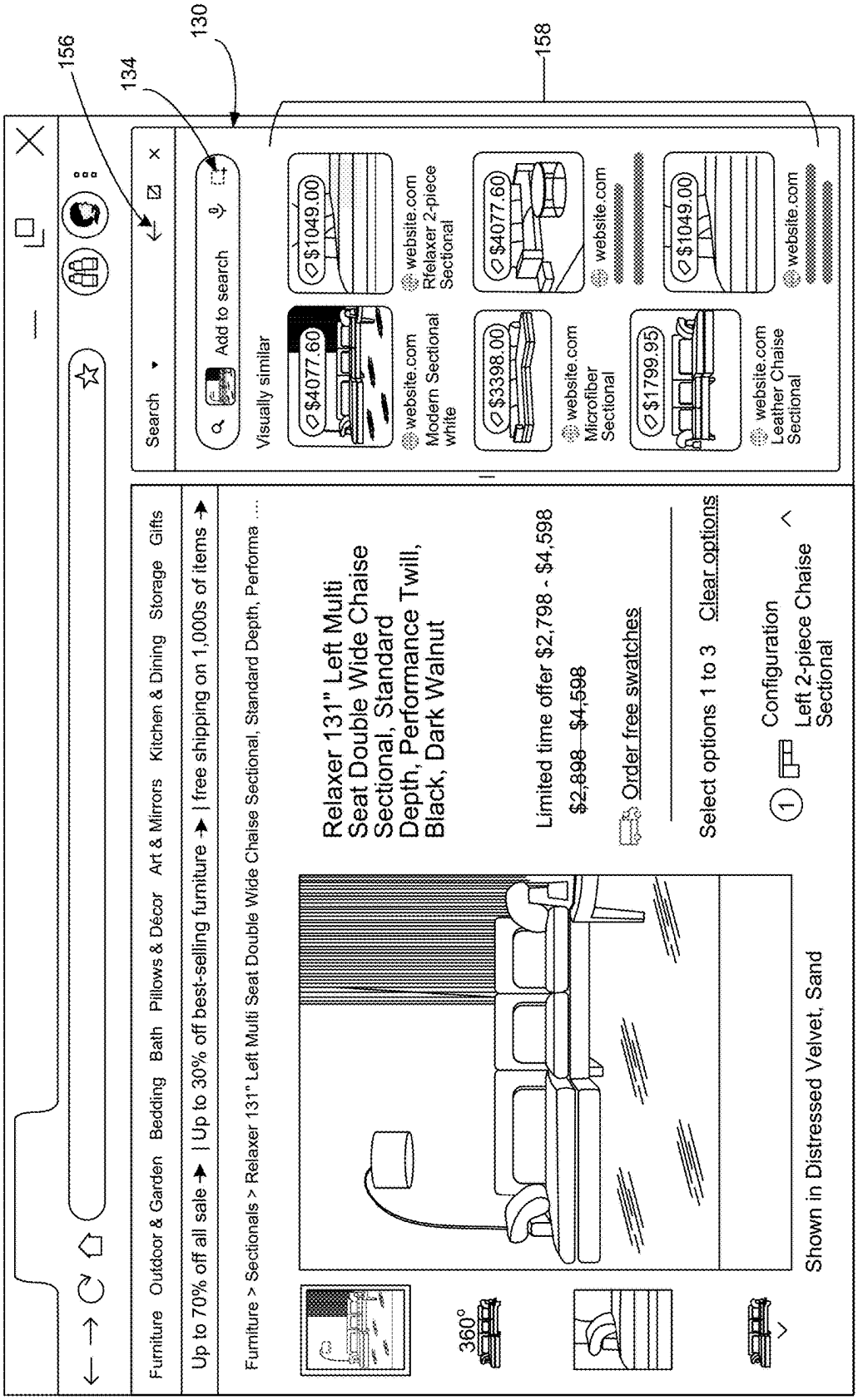
156
134
130
158
Furniture Outdoor & Garden Bedding Bath Pillows & Décor Art & Mirrors Kitchen & Dining Storage Gifts
Up to 70% off all sale | Up to 30% off best-selling furniture | free shipping on 1,000s of items
Furniture > Sectionals > Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performa ....
Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performance Twill, Black, Dark Walnut
Limited time offer $2,798 - $4,598
$2,898 $4,598
Order free swatches
Select options 1 to 3 Clear options
1 Configuration
Left 2-piece Chaise Sectional
Shown in Distressed Velvet, Sand
360°
Search
Add to search
Visually similar
$4077.60
website.com
Modern Sectional white
$1049.00
website.com
Rfelaxer 2-piece Sectional
$3398.00
website.com
Microfiber Sectional
$4077.60
website.com
$1799.95
website.com
Leather Chaise Sectional
$1049.00
website.com

FIG. 1E

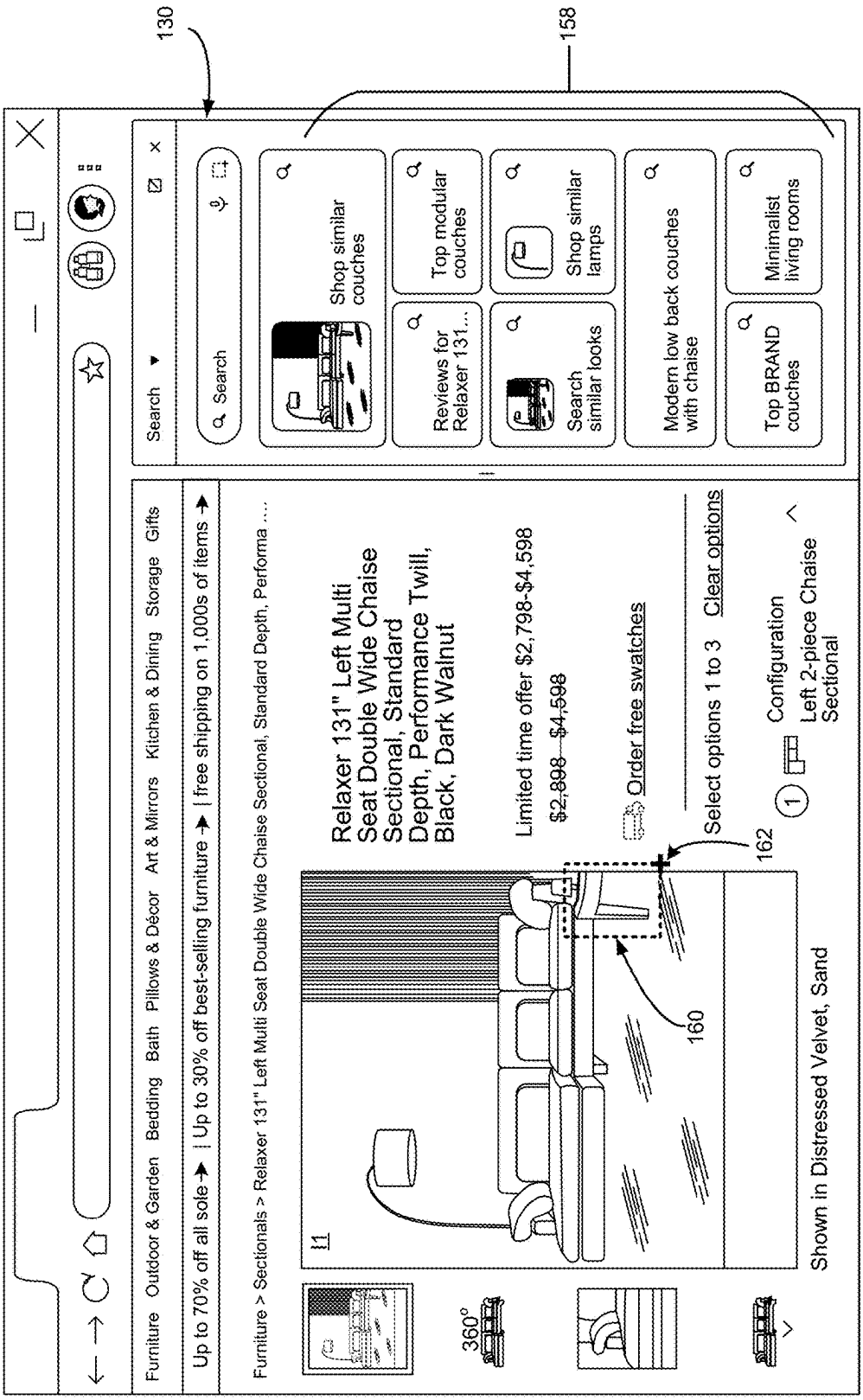
130
158
Search
Search
Shop similar couches
Top modular couches
Reviews for Relaxer 131...
Shop similar lamps
Search similar looks
Modern low back couches with chaise
Top BRAND couches
Minimalist living rooms
Furniture Outdoor & Garden Bedding Bath Pillows & Décor Art & Mirrors Kitchen & Dining Storage Gifts
Up to 70% off all sole | Up to 30% off best-selling furniture | free shipping on 1,000s of items
Furniture > Sectionals > Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performa ...
Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performance Twill, Black, Dark Walnut
Limited time offer $2,798-$4,598
$2,898 $4,598
Order free swatches
160
162
Select options 1 to 3 Clear options
Configuration
Left 2-piece Chaise Sectional
Shown in Distressed Velvet, Sand
360°

FIG. 1F

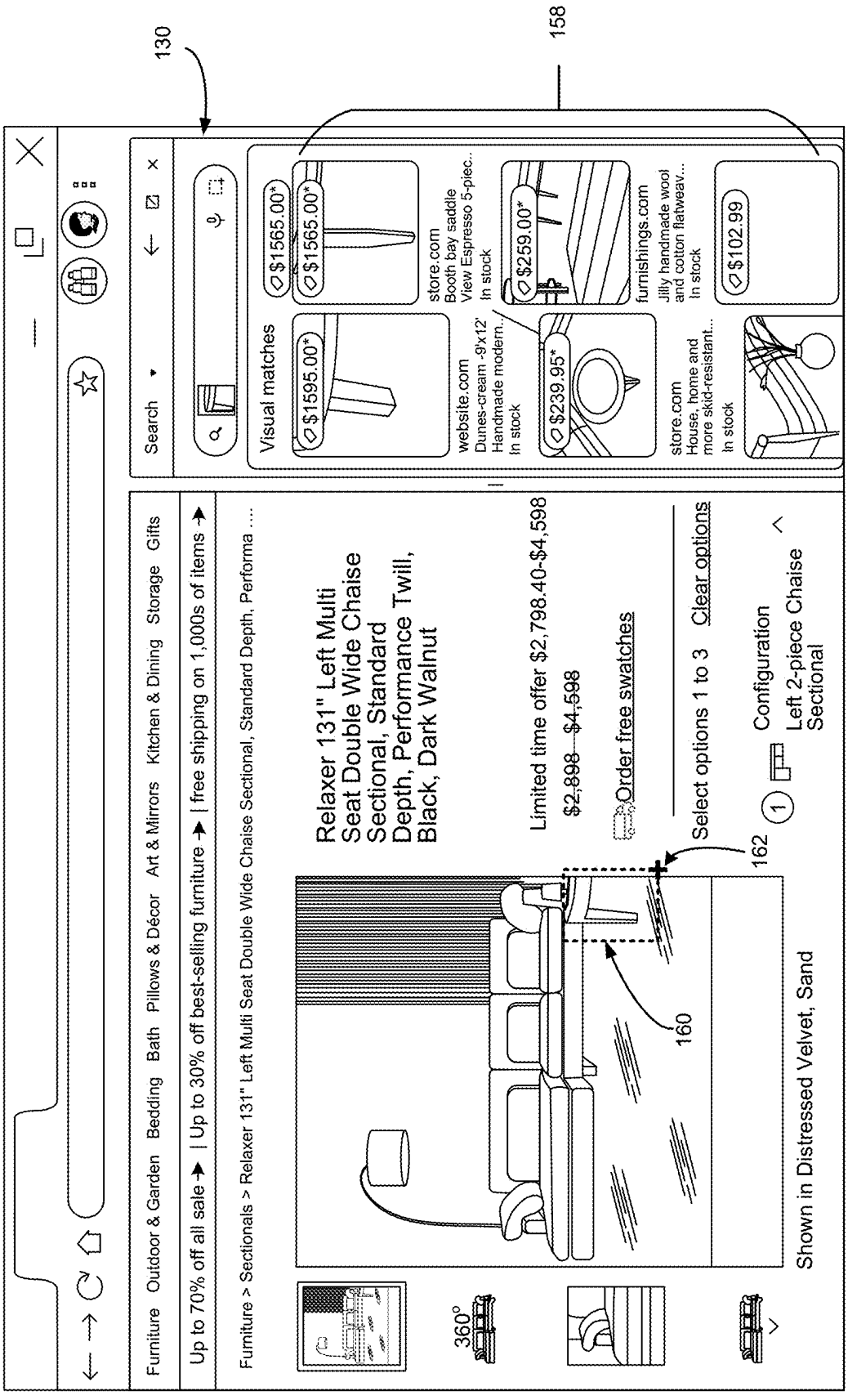
130
158
Search
Visual matches
$1595.00*
website.com
Dunes-cream -9'x12' Handmade modern...
In stock
$1565.00*
$1565.00*
store.com
Booth bay saddle View Espresso 5-piec...
In stock
$259.00*
furnishings.com
Jilly handmade wool and cotton flatweav...
In stock
$239.95*
store.com
House, home and more skid-resistant...
In stock
$102.99
Furniture Outdoor & Garden Bedding Bath Pillows & Décor Art & Mirrors Kitchen & Dining Storage Gifts
Up to 70% off all sale | Up to 30% off best-selling furniture | free shipping on 1,000s of items
Furniture > Sectionals > Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performa ....
Relaxer 131" Left Multi Seat Double Wide Chaise Sectional, Standard Depth, Performance Twill, Black, Dark Walnut
Limited time offer $2,798.40-$4,598
$2,898 $4,598
Order free swatches
Select options 1 to 3 Clear options
Configuration
Left 2-piece Chaise Sectional
Shown in Distressed Velvet, Sand
160
162
360°

FIG. 1G

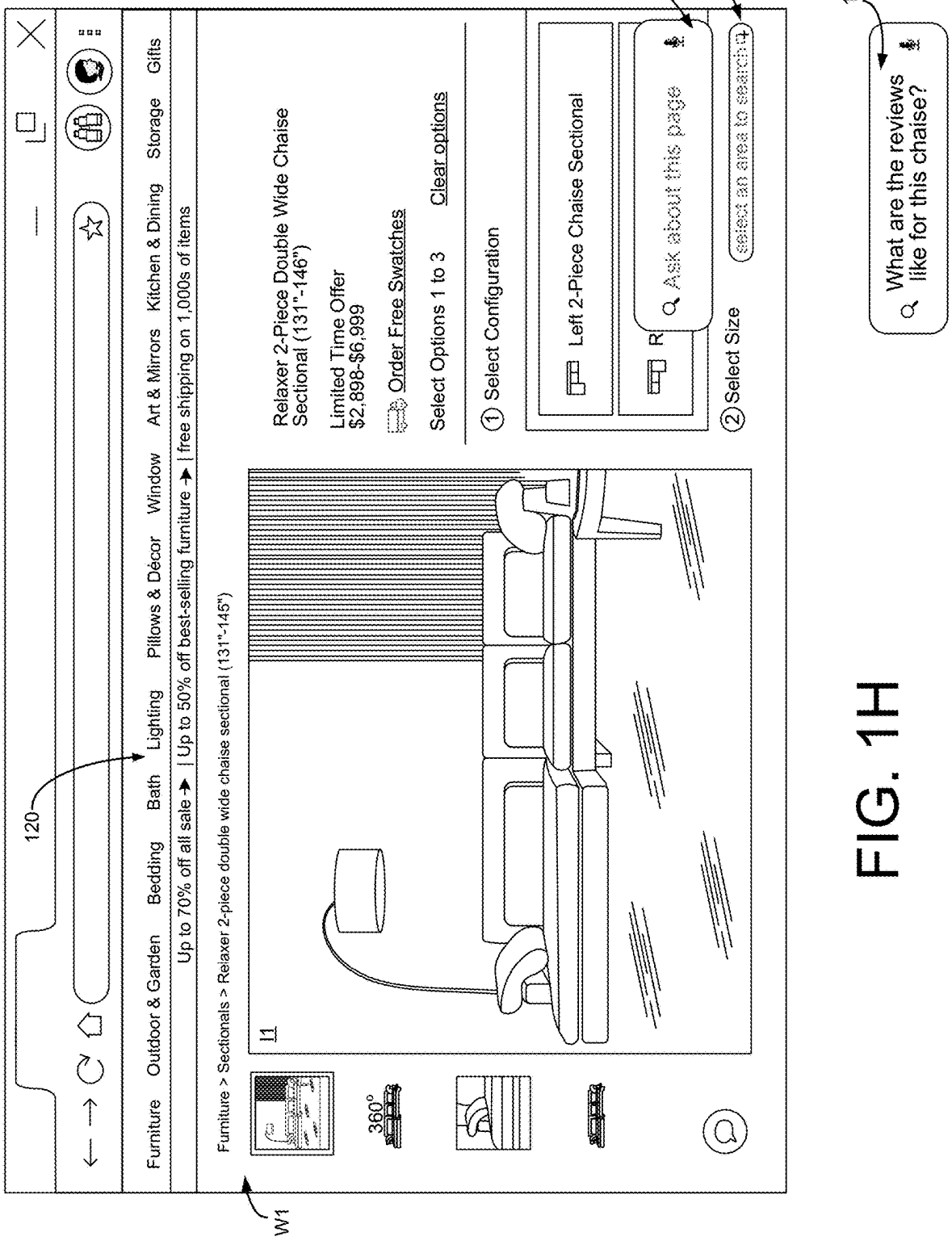
120
Furniture
Outdoor & Garden
Bedding
Bath
Lighting
Pillows & Décor
Window
Art & Mirrors
Kitchen & Dining
Storage
Gifts
Up to 70% off all sale → | Up to 50% off best-selling furniture → | free shipping on 1,000s of items
Furniture > Sectionals > Relaxer 2-piece double wide chaise sectional (131"-145")
W1
360°
Relaxer 2-Piece Double Wide Chaise Sectional (131"-146")
Limited Time Offer
$2,898-$6,999
Order Free Swatches
Select Options 1 to 3
Clear options
① Select Configuration
Left 2-Piece Chaise Sectional
Ask about this page
② Select Size
select an area to search
170
172
170'
What are the reviews like for this chaise?

FIG. 1H

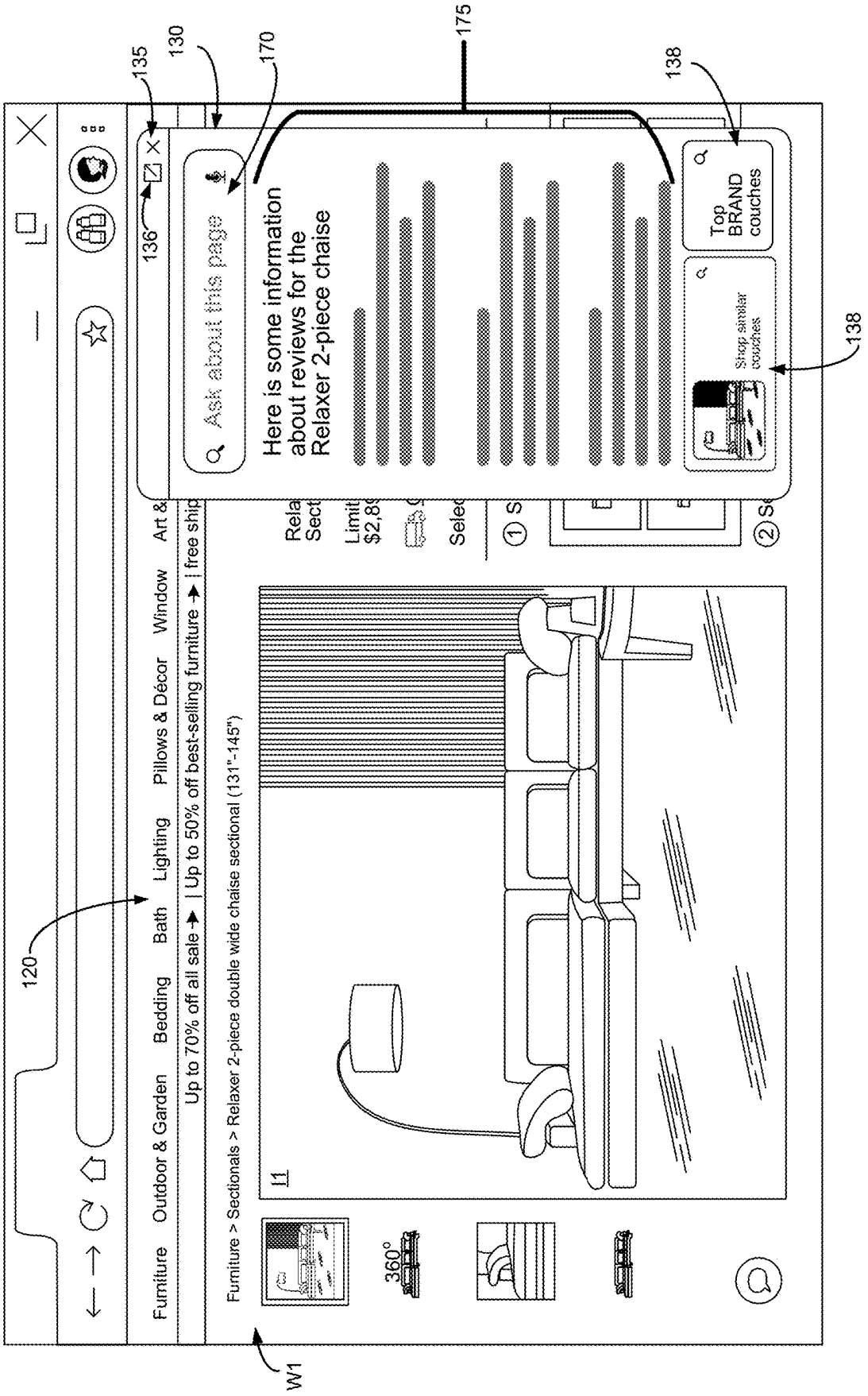
W1
120
135
130
170
175
138
136
Ask about this page
Here is some information about reviews for the Relaxer 2-piece chaise
Top BRAND couches
Shop similar couches
Furniture
Outdoor & Garden
Bedding
Bath
Lighting
Pillows & Décor
Window
Art &
Up to 70% off all sale → | Up to 50% off best-selling furniture → | free ship
Furniture > Sectionals > Relaxer 2-piece double wide chaise sectional (131"-145")
360°

FIG. 1I

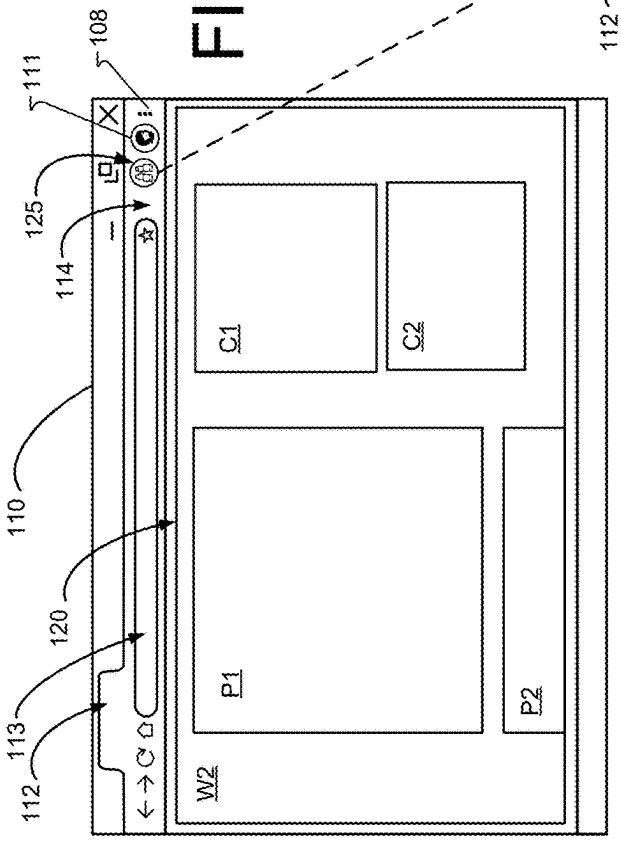
108
111
125
114
110
120
113
112
C1
C2
P1
P2
W2

FIG. 2A

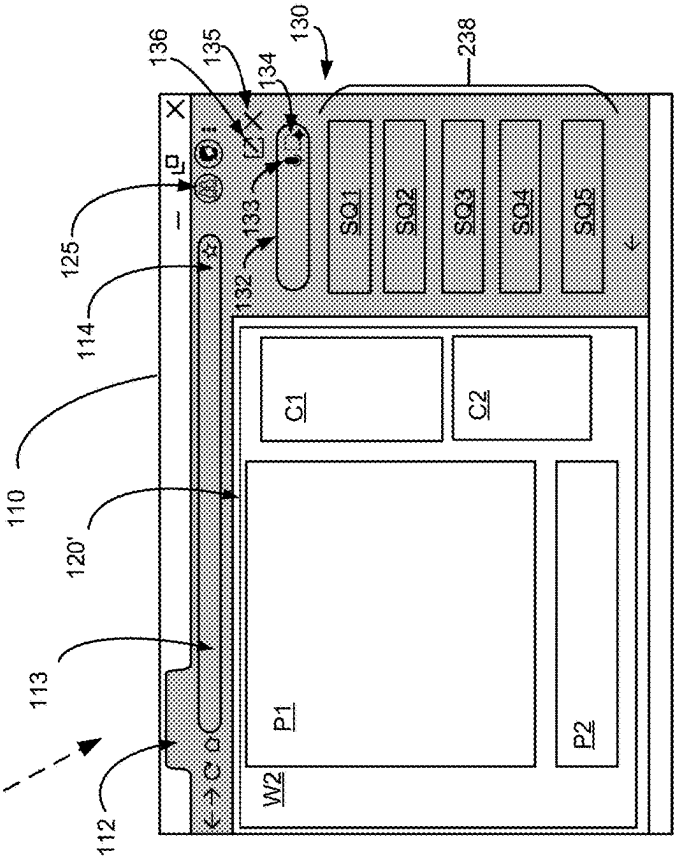
136
135
134
130
238
125
114
133
132
110
120'
113
112
SQ1
SQ2
SQ3
SQ4
SQ5
C1
C2
P1
P2
W2

FIG. 2B

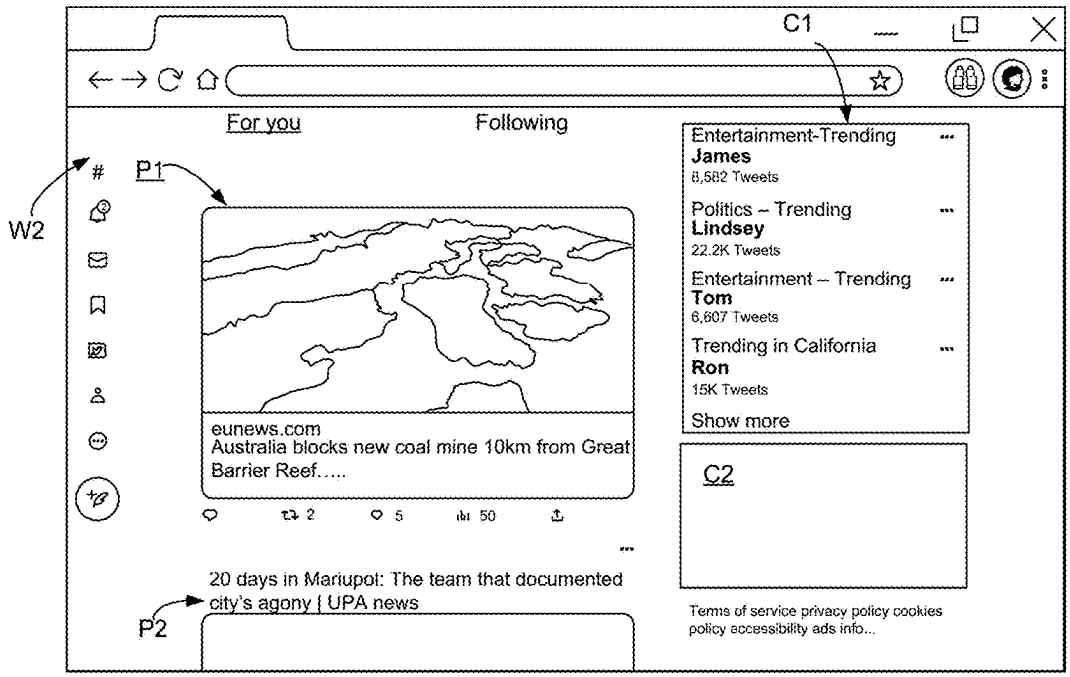
C1
For you
Following
W2
P1
Entertainment-Trending
James
8,582 Tweets
Politics – Trending
Lindsey
22.2K Tweets
Entertainment – Trending
Tom
6,607 Tweets
Trending in California
Ron
15K Tweets
Show more
C2
eunews.com
Australia blocks new coal mine 10km from Great Barrier Reef.....
20 days in Mariupol: The team that documented city's agony | UPA news
P2
Terms of service privacy policy cookies policy accessibility ads info...

FIG. 2C

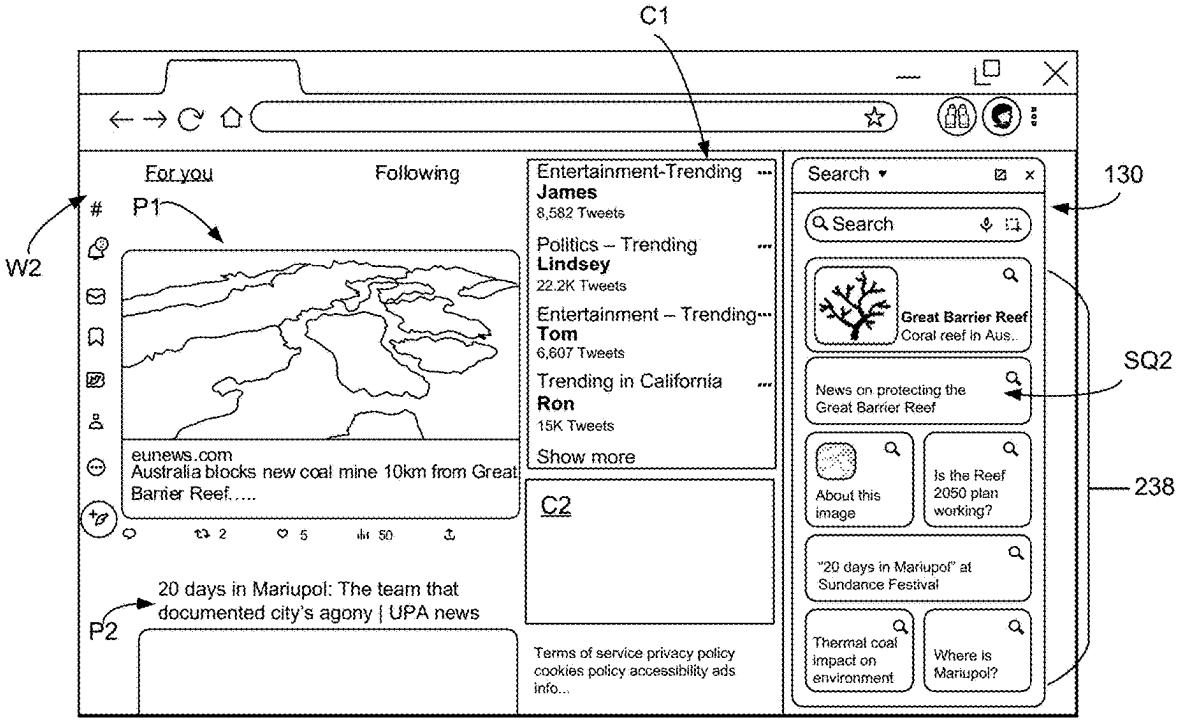
C1
For you
Following
W2
P1
Entertainment-Trending
James
8,582 Tweets
Politics – Trending
Lindsey
22.2K Tweets
Entertainment – Trending
Tom
6,607 Tweets
Trending in California
Ron
15K Tweets
Show more
C2
Search
130
Great Barrier Reef
Coral reef in Aus..
News on protecting the Great Barrier Reef
SQ2
About this image
Is the Reef 2050 plan working?
238
"20 days in Mariupol" at Sundance Festival
Thermal coal impact on environment
Where is Mariupol?
eunews.com
Australia blocks new coal mine 10km from Great Barrier Reef.....
20 days in Mariupol: The team that documented city's agony | UPA news
P2
Terms of service privacy policy cookies policy accessibility ads info...

FIG. 2D

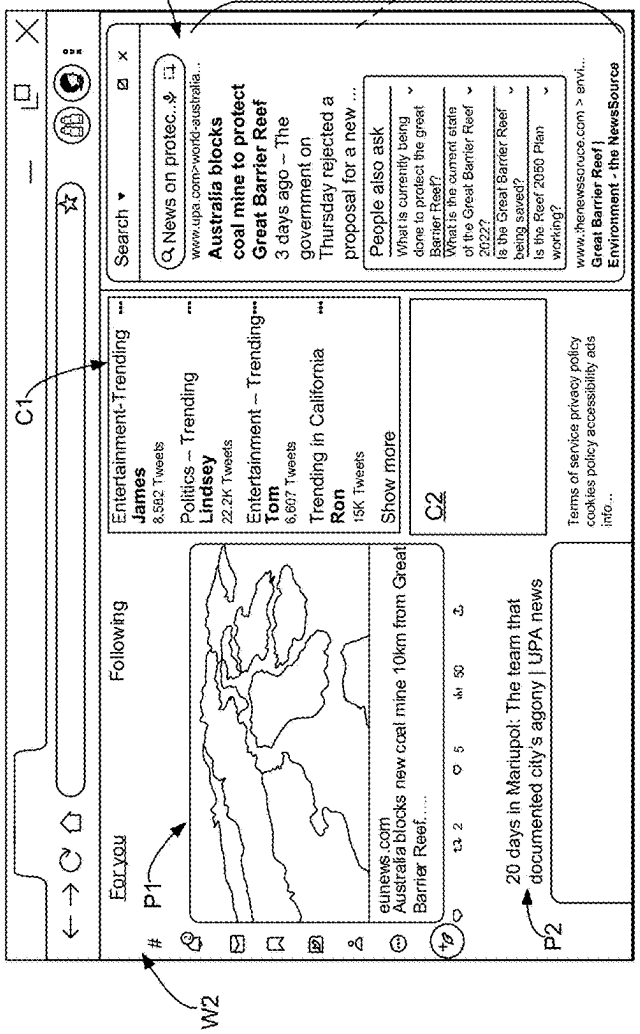
W2
For you
Following
P1
eunews.com
Australia blocks new coal mine 10km from Great Barrier Reef....
20 days in Mariupol: The team that documented city's agony | UPA news
P2
C1
Entertainment-Trending
James
8,582 Tweets
Politics – Trending
Lindsey
22.2K Tweets
Entertainment – Trending
Tom
6,827 Tweets
Trending in California
Ron
15K Tweets
Show more
C2
Terms of service privacy policy cookies policy accessibility ads info...
Search
News on protec...
www.upa.com>world-australia...
Australia blocks coal mine to protect Great Barrier Reef
3 days ago – The government on Thursday rejected a proposal for a new ...
People also ask
What is currently being done to protect the great Barrier Reef?
What is the current state of the Great Barrier Reef in 2022?
Is the Great Barrier Reef being saved?
Is the Reef 2050 Plan working?
www.thenewssource.com > envi...
Great Barrier Reef | Environment - the NewsSource
130
236

FIG. 2E

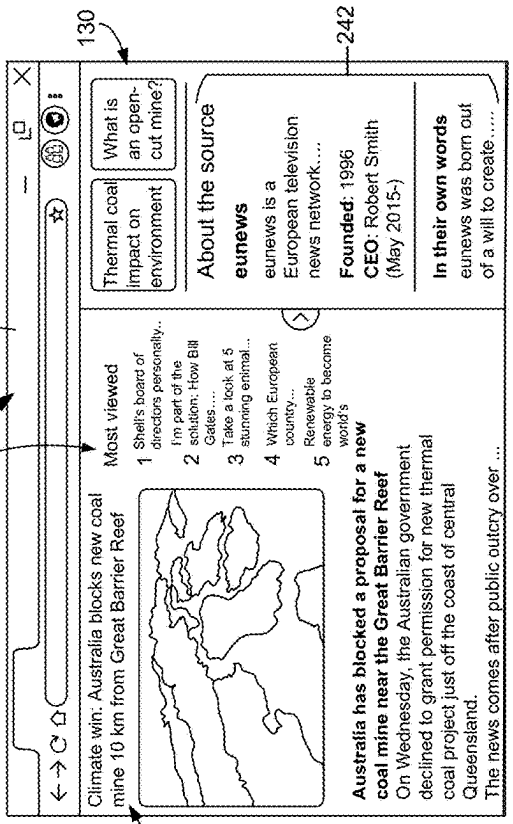
120'
110
130
242
W3
Climate win: Australia blocks new coal mine 10 km from Great Barrier Reef
Most viewed
1 Shell's board of directors personally...
2 I'm part of the solution. How Bill Gates....
3 Take a look at 5 stunning animal...
4 Which European country...
5 Renewable energy to become world's
Thermal coal impact on environment
What is an open-cut mine?
About the source
eunews
eunews is a European television news network....
Founded: 1996
CEO: Robert Smith (May 2015-)
In their own words
eunews was born out of a will to create.....
Australia has blocked a proposal for a new coal mine near the Great Barrier Reef
On Wednesday, the Australian government declined to grant permission for new thermal coal project just off the coast of central Queensland.
The news comes after public outcry over ...

FIG. 2F

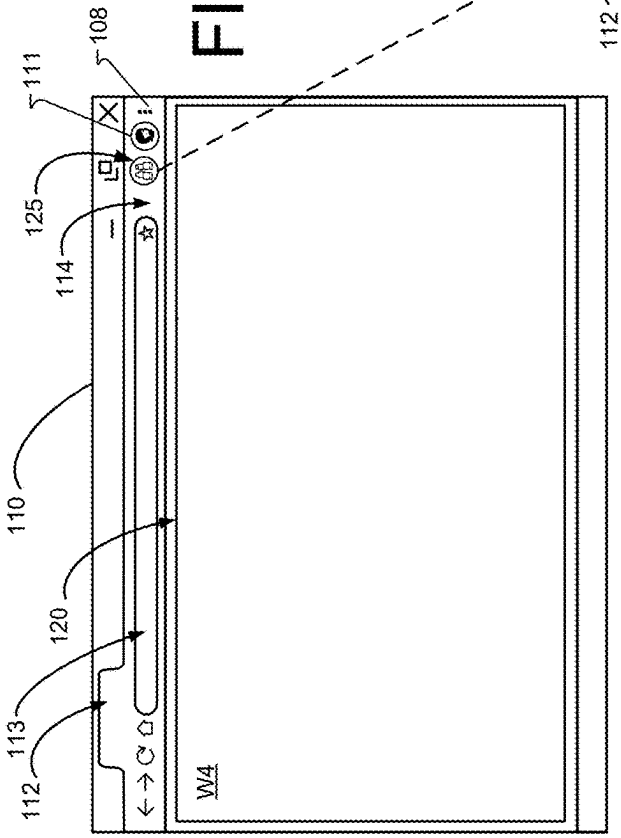
108
111
125
114
110
120
113
112
W4

FIG. 3A

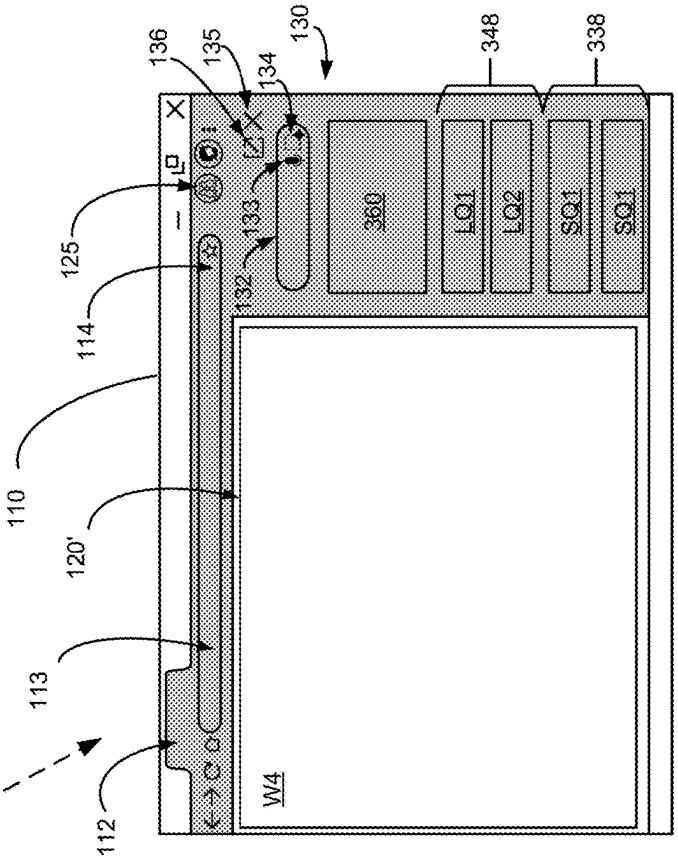
136
135
134
130
348
338
125
114
110
120'
113
112
133
132
360
LQ1
LQ2
SQ1
SQ1
W4

FIG. 3B

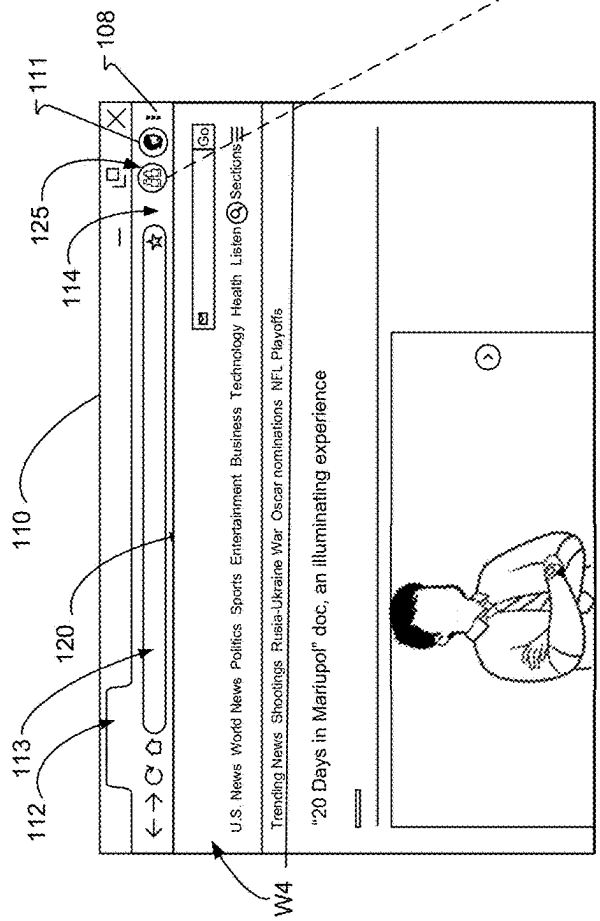
U.S. News World News Politics Sports Entertainment Business Technology Health Listen Sections
Trending News Shootings Russia-Ukraine War Oscar nominations NFL Playoffs
"20 Days in Mariupol" doc, an illuminating experience
Go
108
111
125
114
110
120
113
112
W4

FIG. 3C

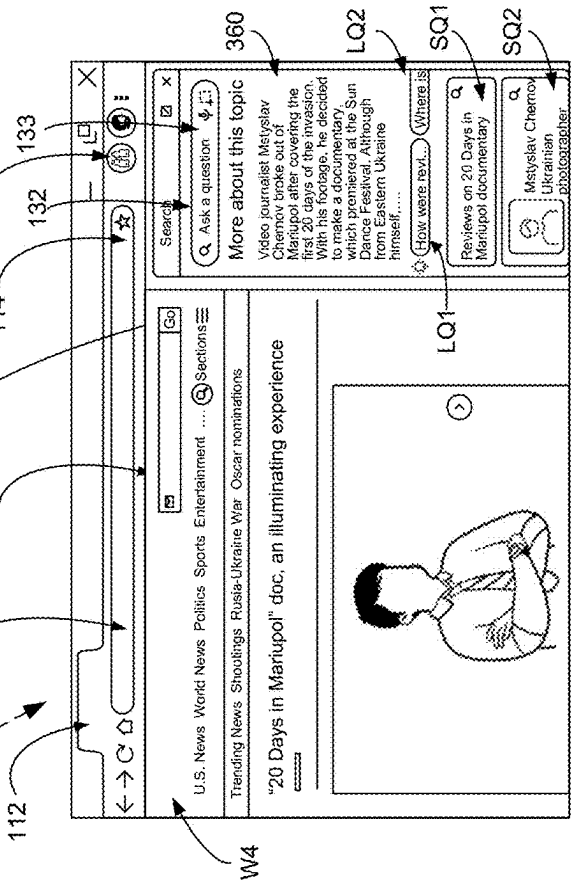
U.S. News World News Politics Sports Entertainment .... Sections
Trending News Shootings Russia-Ukraine War Oscar nominations
"20 Days in Mariupol" doc, an illuminating experience
Search
Ask a question
More about this topic
Video journalist Mstyslav Chernov broke out of Mariupol after covering the first 20 days of the invasion. With his footage, he decided to make a documentary, which premiered at the Sun Dance Festival. Although from Eastern Ukraine himself, ...
How were revi...
Where is
Reviews on 20 Days in Mariupol documentary
Mstyslav Chernov Ukrainian photographer
360
LQ2
SQ1
SQ2
LQ1
133
132
125
114
110
120'
113
112
W4

FIG. 3D

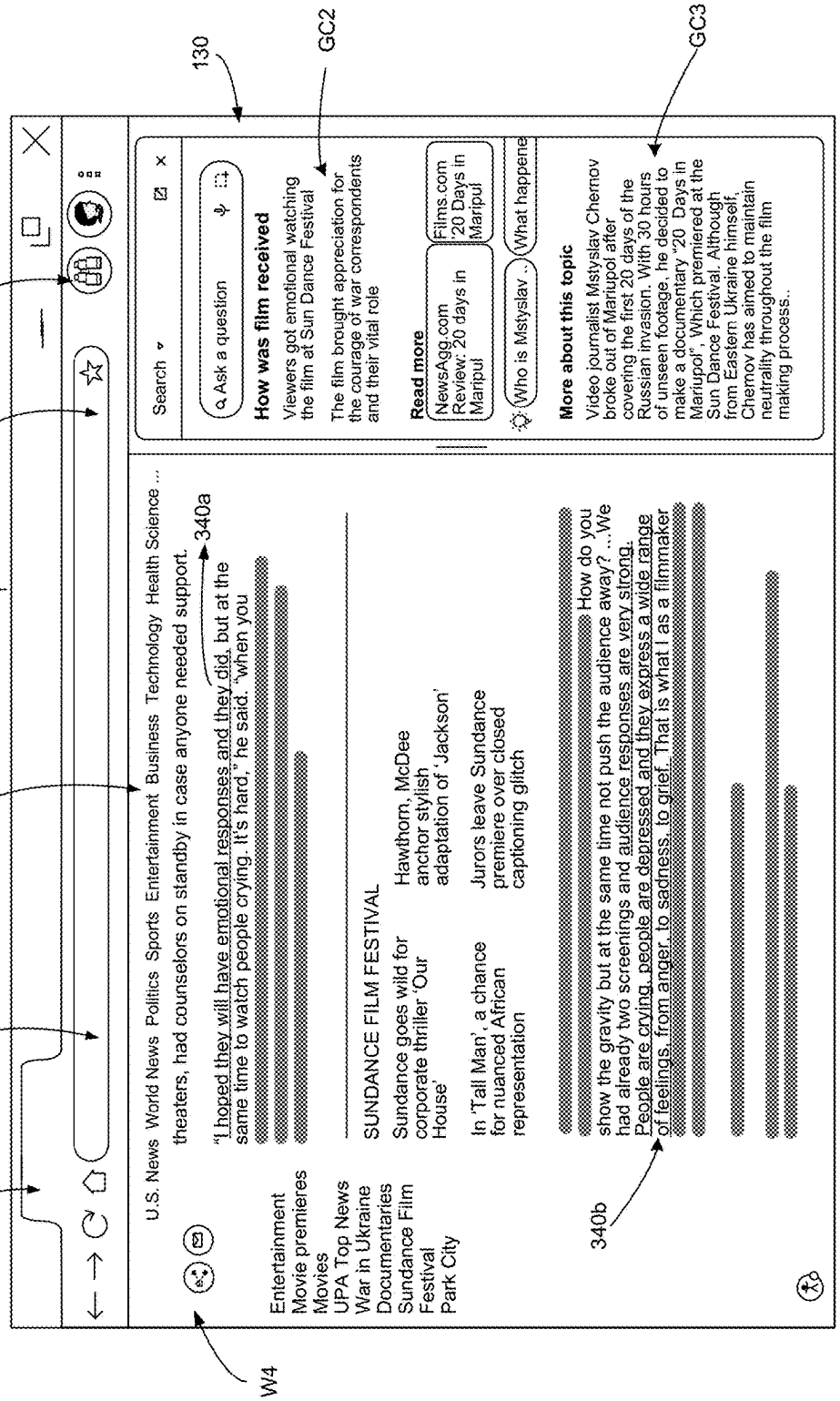
112
113
120'
110
114
125
130
GC2
GC3
340a
340b
W4
U.S. News World News Politics Sports Entertainment Business Technology Health Science ...
Entertainment
Movie premieres
Movies
UPA Top News
War in Ukraine
Documentaries
Sundance Film Festival
Park City
theaters, had counselors on standby in case anyone needed support.
"I hoped they will have emotional responses and they did, but at the same time to watch people crying. It's hard," he said. "when you
SUNDANCE FILM FESTIVAL
Sundance goes wild for corporate thriller 'Our House'
Hawthorn, McDee anchor stylish adaptation of 'Jackson'
In 'Tall Man', a chance for nuanced African representation
Jurors leave Sundance premiere over closed captioning glitch
How do you show the gravity but at the same time not push the audience away? ...We had already two screenings and audience responses are very strong. People are crying, people are depressed and they express a wide range of feelings, from anger, to sadness, to grief. That is what I as a filmmaker
Search
Ask a question
How was film received
Viewers got emotional watching the film at Sun Dance Festival
The film brought appreciation for the courage of war correspondents and their vital role
Read more
NewsAgg.com Review: 20 days in Mariupul
Films.com '20 Days in Mariupul
Who is Mstyslav ..
What happene
More about this topic
Video journalist Mstyslav Chernov broke out of Mariupol after covering the first 20 days of the Russian invasion. With 30 hours of unseen footage, he decided to make a documentary "20 Days in Mariupol", Which premiered at the Sun Dance Festival. Although from Eastern Ukraine himself, Chernov has aimed to maintain neutrality throughout the film making process..

FIG. 3E

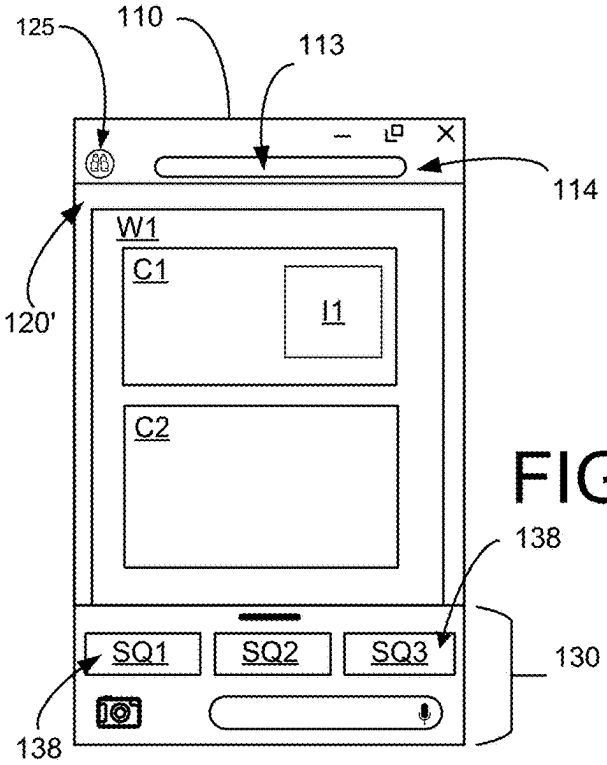
125
110
113
114
W1
C1
I1
120'
C2
138
SQ1
SQ2
SQ3
130
138

FIG. 4A

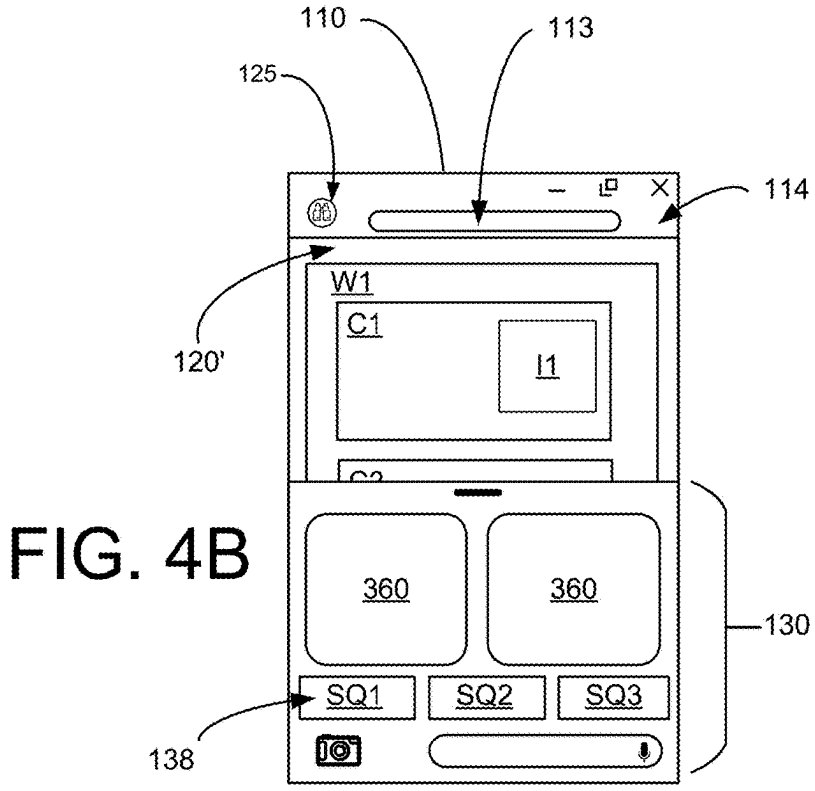
110
113
125
114
W1
C1
I1
120'
360
360
130
SQ1
SQ2
SQ3
138

FIG. 4B

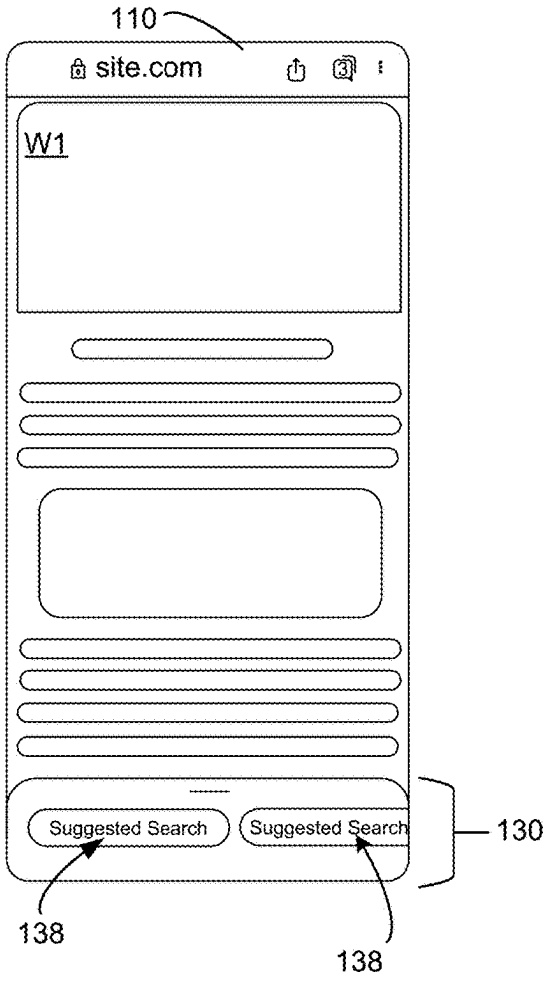
110
site.com
W1
Suggested Search
Suggested Search
130
138
138

FIG. 4C

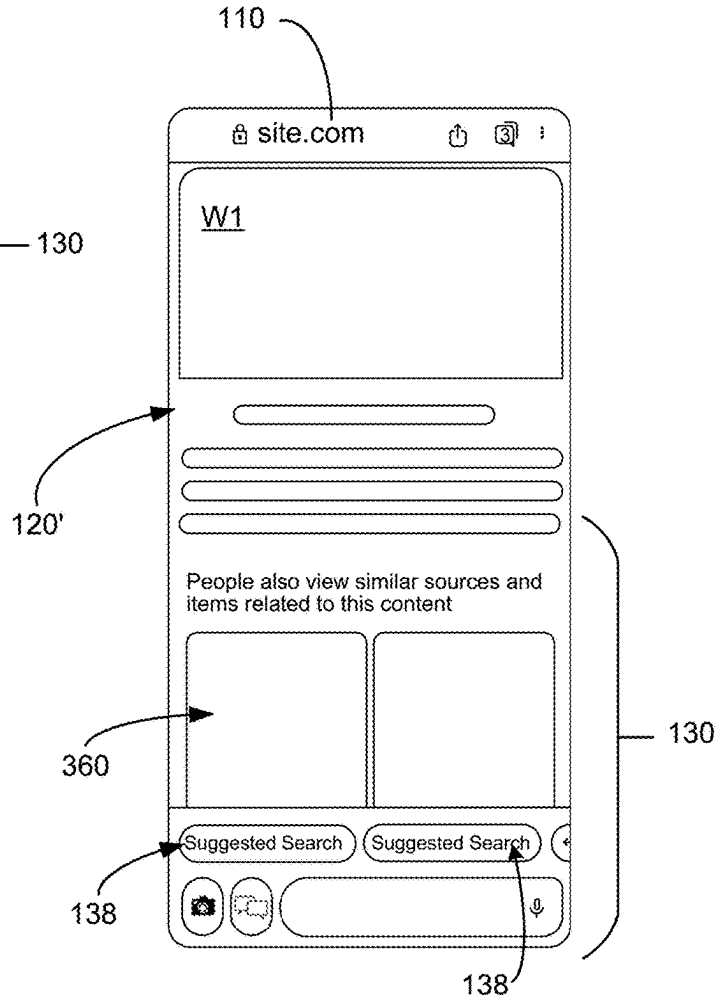
110
site.com
W1
120'
People also view similar sources and items related to this content
360
130
Suggested Search
Suggested Search
138
138

FIG. 4D

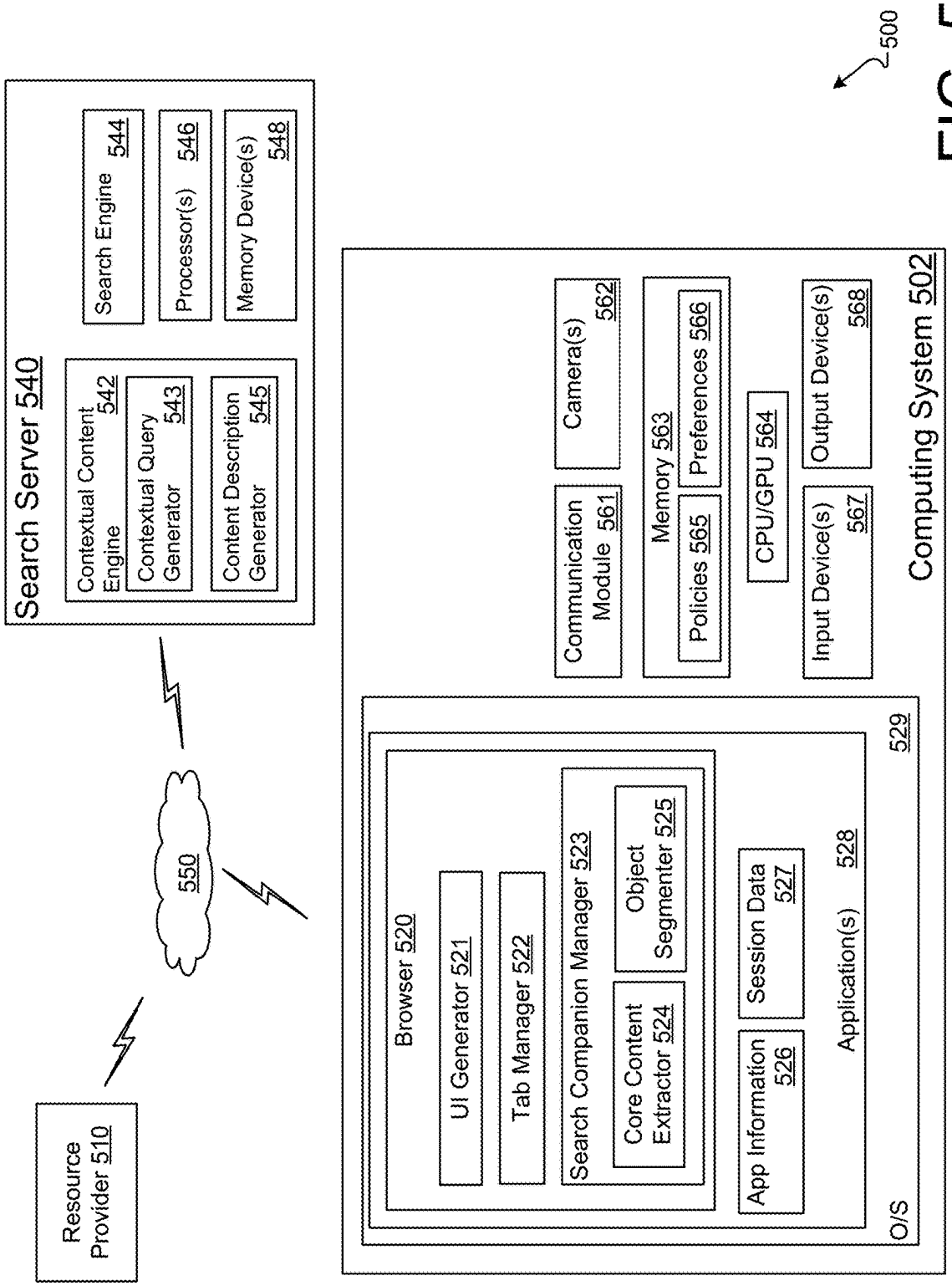
500
Search Server 540
Contextual Content Engine 542
Contextual Query Generator 543
Content Description Generator 545
Search Engine 544
Processor(s) 546
Memory Device(s) 548
550
Resource Provider 510
Computing System 502
Communication Module 561
Camera(s) 562
Memory 563
Policies 565
Preferences 566
CPU/GPU 564
Input Device(s) 567
Output Device(s) 568
O/S
Browser 520
UI Generator 521
Tab Manager 522
Search Companion Manager 523
Core Content Extractor 524
Object Segmenter 525
App Information 526
Session Data 527
Application(s) 528
529

FIG. 5

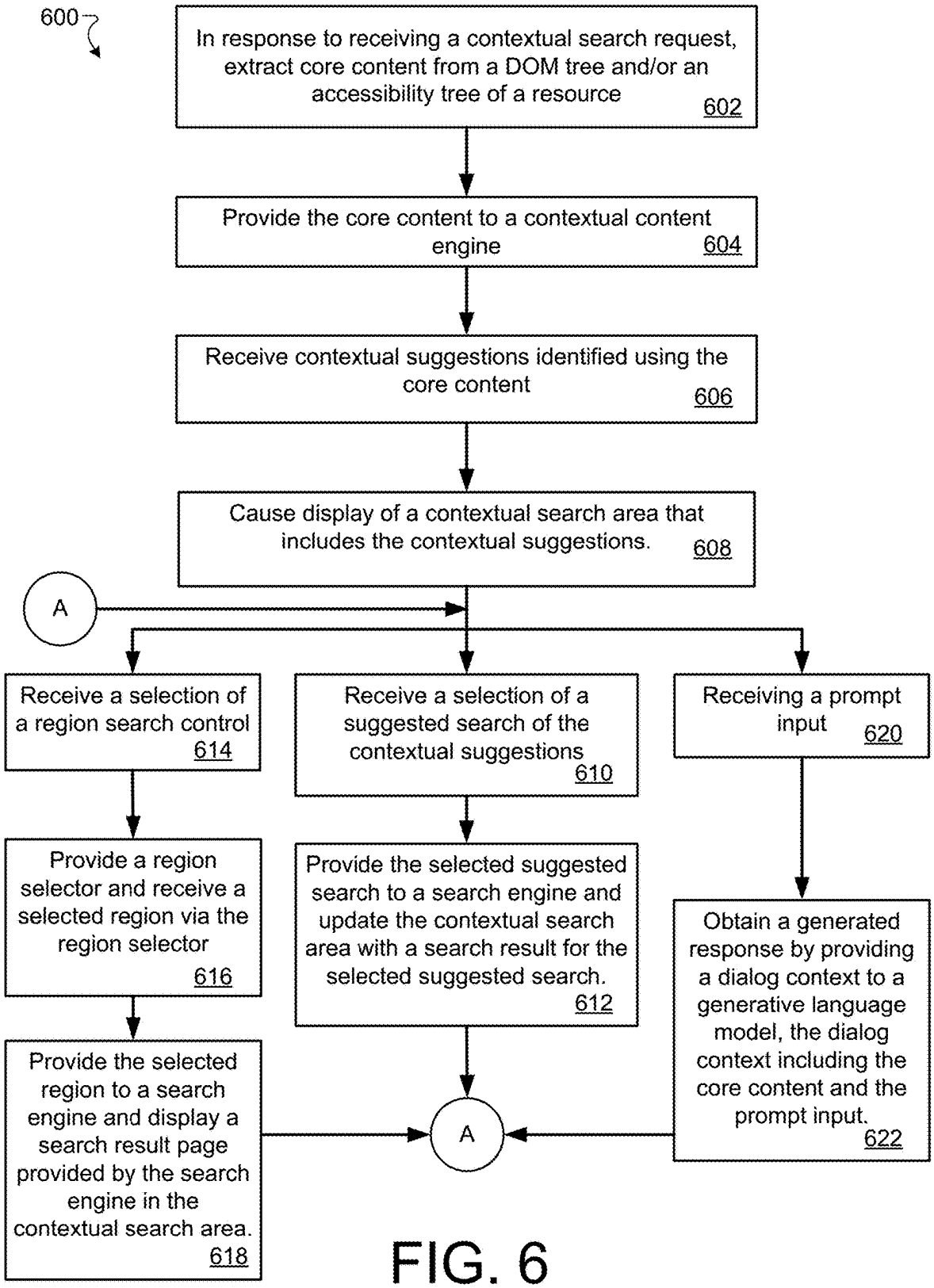
600
In response to receiving a contextual search request, extract core content from a DOM tree and/or an accessibility tree of a resource 602
Provide the core content to a contextual content engine 604
Receive contextual suggestions identified using the core content 606
Cause display of a contextual search area that includes the contextual suggestions. 608
A
Receive a selection of a region search control 614
Receive a selection of a suggested search of the contextual suggestions 610
Receiving a prompt input 620
Provide a region selector and receive a selected region via the region selector 616
Provide the selected suggested search to a search engine and update the contextual search area with a search result for the selected suggested search. 612
Obtain a generated response by providing a dialog context to a generative language model, the dialog context including the core content and the prompt input. 622
Provide the selected region to a search engine and display a search result page provided by the search engine in the contextual search area. 618
A

FIG. 6

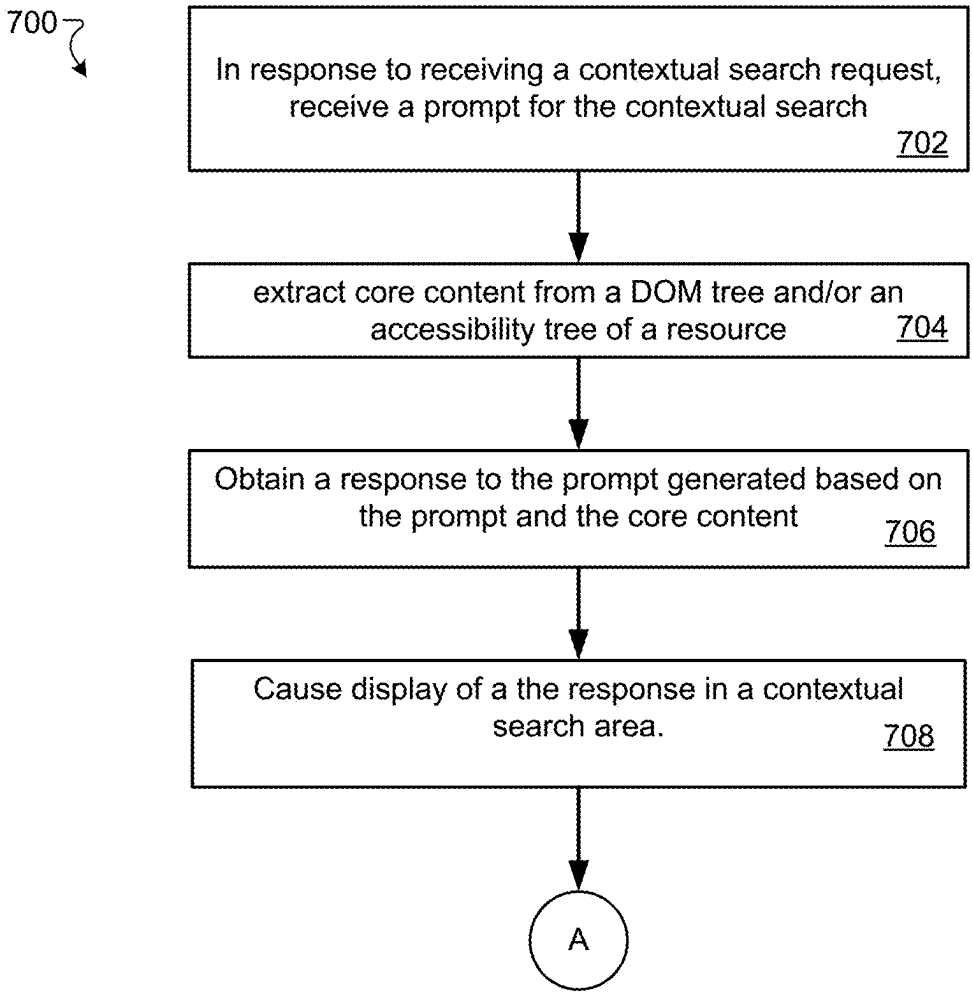
700
In response to receiving a contextual search request, receive a prompt for the contextual search
702
extract core content from a DOM tree and/or an accessibility tree of a resource
704
Obtain a response to the prompt generated based on the prompt and the core content
706
Cause display of a the response in a contextual search area.
708
A

FIG. 7

CONTEXTUAL SEARCH TOOL IN A BROWSER INTERFACE

RELATED APPLICATIONS

This application is a continuation of PCT Application No. PCT/US24/16955, filed Feb. 22, 2024, which claims priority to U.S. Provisional Application No. 63/486,451, filed Feb. 22, 2023, the disclosures of which are incorporated herein by reference.

DISCLOSURE

Websites provide information or functionality helpful to users and many users use the Internet to research products, places, companies, services, view social media or new feeds, etc.

SUMMARY

Implementations relate to a tool integrated into the browser that can provide additional context for main content, suggest content related to main content, summarize main content, etc., without navigating away from the main content. Main content is content for a resource, e.g., a webpage, a document, an image, etc., fetched by a browser. Main content is associated with a location (e.g., a URL) and a content provider. The main content may be content visible in the viewport of the browser. In some instances, main content may also include content of the resource not visible in the viewport. The contextual search tool provides the contextual content, suggested content, or summarized content in a search area of the browser, which enables a user to explore information about the main content without navigating away from the main content. The search area remains under the control of the browser and is not accessible to the provider of the main content. Implementations may extract at least some content from the main content. Implementations may use the extracted content to provide contextual search suggestions. Implementations may use the extracted content to provide generated content relevant to the main content. Implementations may use the extracted content to identify entities to provide additional contextual information on. The extracted content may be referred to as core content.

According to one aspect, the techniques described herein relate to a computer-implemented method, including: receiving a contextual search request relating to main content, the main content being displayed in a display area of a browser; extracting at least some content from the main content; receiving a contextual suggestion associated with the at least some content; and as a response to the contextual search request, causing display of the contextual suggestion in a contextual search area within the browser.

According to one aspect, the techniques described herein relate to a computer-implemented method, including: receiving a contextual search request for main content, the main content being displayed in a display area of a browser; receiving a prompt input; extracting content from the main content; receiving generated content based on the prompt input and the extracted content; and causing display of the generated content in a contextual search area that is within the browser.

The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B are diagrams that illustrate initiation of a contextual search tool in a contextual search area for content displayed within a display area of a browser, according to an implementation.

FIG. **1**C illustrates example main content corresponding to FIG. **1**A.

FIG. **1**D illustrates an example contextual search area with example contextual search suggestions corresponding to FIG. **1**B, according to an implementation.

FIG. **1**E illustrates an example contextual search area displayed in response to selection of SQ**1** of FIG. **1**D.

FIG. **1**F illustrates an example browser interface displayed in response to selection of a region search control in FIG. **1**D.

FIG. **1**G illustrates an example browser interface generated in response to submission of the image search using the region selected in FIG. **1**F.

FIG. **1**H illustrates an example browser interface with a condensed contextual search tool interface, according to an implementation.

FIG. **1**I illustrates an example contextual search area with example contextual content and contextual search suggestions generated from a prompt provided in FIG. **1**H, according to an implementation.

FIGS. **2**A and **2**B are diagrams that illustrate another variation of initiation of a contextual search tool in a contextual search area for content displayed within a display area of a browser, according to an implementation.

FIG. **2**C illustrates example main content corresponding to FIG. **2**A.

FIG. **2**D illustrates an example contextual search area with example contextual search suggestions corresponding to FIG. **2**B, according to an implementation.

FIG. **2**E is a diagram illustrating a contextual search area with a result of a contextual search query selected in FIG. **2**D.

FIG. **2**F is a diagram illustrating an updated display area and an updated contextual search area generated in response to selection of a search result in the contextual search area of FIG. **2**E.

FIGS. **3**A and **3**B are diagrams that illustrate another variation of initiation of a contextual search tool in a contextual search area for content displayed within a display area of a browser, according to an implementation.

FIG. **3**C illustrates example main content corresponding to FIG. **3**A.

FIG. **3**D illustrates an example contextual search area with example generated content, local search queries, and contextual search suggestions corresponding to FIG. **3**B, according to an implementation.

FIG. **3**E is a diagram illustrating a contextual search area **130** with a result of a contextual search query selected in FIG. **3**D.

FIGS. **4**A and **4**B illustrate a contextual search tool in a contextual search area on a device with a limited display area.

FIG. **4**C illustrates an example contextual search area corresponding to FIG. **4**A, according to an implementation.

FIG. **4**D illustrates an example contextual search area corresponding to FIG. **4**B, according to an implementation.

FIG. **5** is a diagram that illustrates a computing system and search server for implementing the concepts described herein.

FIG. **6** is a flowchart illustrating an example process for providing a contextual search tool, according to an implementation.

FIG. **7** is a flowchart illustrating an example process for providing a contextual search tool, according to an implementation.

DETAILED DESCRIPTION

This disclosure is related to a browser tool that provides relevant search suggestions, contextually relevant content, and/or an interface for researching content associated with a resource (e.g., webpage) displayed in a display area of the browser. The contextual search tool can be displayed within a contextual search area of the browser, so that the content of a webpage is maintained (e.g., persists) in the browser. The contextual search tool is interactive and can enable a user to access contextually relevant information about the webpage. At least one of the search suggestions in the contextual search area can be selected, and search results for the selected search suggestion can be displayed in the contextual search area while the content in the display area is maintained. Thus, the contextual search tool enables a user to perform context related search tasks (checking on prices or reviews of a product, checking restaurants, hotel availability, or points of interest for a place, viewing a cast list while reading a movie review, etc.) without leaving (navigating away from) the main content. The browser can be referred to as a browser window when associated with a window of an operating system (OS).

At least one technical problem with browsing main content of a resource is that a user may have questions about the content but may not want to leave the content, either by opening a new tab or by navigating away from the resource, to find answers. At least another technical problem is that when the user leaves the content (e.g., by opening a new tab or navigating away from the content), there is no context for the browser to assist the user in identifying additional information that answers the question. At least one technical solution provided by the contextual search tool is that the tool aids users in finding the right information by making it easier to dive deeper and find answers via intelligent page content understanding and intelligent content generation. Put another way, the tool combines multiple functionalities in one place and uses intelligent understanding of the text and/or images in main content to help a user answer questions, understand content, and discover new information. The content of a resource is maintained (e.g., persists) in the browser in a separate display area while the contextual search tool, including suggested searches, search results, and contextual information are displayed. At least one technical effect of the tool is a reduction in the number of interactions a user has with the browser to navigate to different resources and submit different queries. At least another technical result is to present generative content related to the main content to aid in understanding a resource.

In some implementations, a contextual search area can be integrated as part of the browser so that the contextual search area may not be spoofed (e.g., imitated) by a third party or the owner of the webpage content. This can be implemented as a security feature so that a user can distinguish legitimate contextual search content provided by the contextual search tool from other content, including search results, that can be inserted by a third party or by the provider of a webpage or other resource. Accordingly, the technical problem of spoofing content can be obviated by the technical solution of integrating a contextual search area within the browser. The technical effect of integration of a contextual search area within a browser is that spoofing can be prevented and/or more easily recognized by the user.

The implementations described herein enable improved guided human-machine interactions for viewing webpages and other resources on the one side and displaying contextually relevant information on the other side. In some implementations, the contextually relevant information changes as the user scrolls the main content in the display area. The viewing of a webpage and the contextual information that helps a user understand and/or explore the content of the webpage are done simultaneously by using one user interface only. This results in fewer interactions of the user with the user interface as the user may easily conduct a search, find and view relevant information about content while simultaneously viewing the content.

Implementations include a core content extractor that scrapes the main content, e.g., by examining the document object model (DOM) tree for the main content and/or the accessibility tree for the main content, to identify core content. The core content may thus represent at least some content extracted from the main content, or in other words, extracted content. The core content includes text. The core content can include text and/or images represented in the main content. In some implementations, the core content extractor can be a machine-learned extraction model. The core content extractor can be configured to exclude certain types of information from the core content. For example, excluded content may include user information, sensitive information, third-party information (e.g., content supplied by an entity that is not the content provider, such as ads), etc. For example, the extraction model can be trained to recognize and exclude user information, sensitive information, third-party information, etc.

Implementations use the extracted core content to provide contextual suggestions. The contextual suggestions can include contextual search suggestions. The contextual search suggestions can include an image search based on an image and/or a portion of an image identified in the main content. The contextual search suggestions can include a search for a product or category of product identified using the core content. The contextual search suggestions can include a search for additional information about an entity identified in the main content. The contextual search suggestions can include a name of the entity identified in the core content. The additional information can include user-generated content (e.g., reviews, ratings). The additional information can include news about an entity. The contextual search suggestions can include other searches deemed relevant, such as queries related to the provider of the main content (e.g., based on a URL or a portion of a URL), queries related to content included in the displayed resource but not currently in the viewport, queries for which the main content is deemed responsive, and/or any other queries generated by a contextual query generator.

The contextual search suggestions may be actionable. In other words, a contextual search suggestion may be associated with a selectable control, such as a link, a button, etc., that is configured to, when selected, submit (send) the query to a search engine. Thus, when a contextual search suggestion is selected, implementations initiate a search with a search engine and provide the search results in the contextual search area. Thus, the contextual search tool enables a user to browse informational sources about main content without navigating away from the main content. In some implementations, the contextual search tool may be iterative. For example, selection of a search result presented in the

contextual search area may change the main content, e.g., causing the browser to navigate to the resource identified in the search result and displaying the content of the new resource in the content display area. Having done so, this content becomes the main content, which may be provided to the content extractor, which identifies core content and displays contextual search suggestions in the search area of the browser.

Implementations may use the extracted core content to provide generated content relevant to the main content as a contextual suggestion. For example, the extracted core content may be provided to a generative (large) language model. The generative language model may provide one or more summaries about one or more entities identified in the main content. The generative language model may provide a summary of a large section of text in the main content. The generative language model may provide creative content related to the main content (e.g., generated math problems for a webpage discussing math problems, a generated poem for a discussion of writings in iambic pentameter, a suggested dinner menu for an invitation website, etc.) and the like. The generated content can be any content generated by a generative language model based on the core content. The generated content can be any content generated by a generative language model based on the core content and a prompt. The generated content can include some level of creativity, or in other words include content that is not factual content. In some implementations, the contextual search tool may include a dialog input area. The dialog input area may enable a user to pose questions to a generative (large) language model about the main content, or about any topic, in the form of a prompt input. The generative language model may use the core content, i.e., the content extracted from the main content, as part of the dialog context. This may enable the generative model to increase the relevancy of the generated responses. In some implementations, preference information may also be provided as part of the dialog context. In such implementations, the generative language model may use the preference information, the core content and/or a prompt input to provide the generated content.

Implementations may use the extracted core content to identify entities to provide additional contextual information on as part of a contextual suggestion. For example, implementations may use a model to predict an entity identified in the core content and to provide, e.g., information about the entity from an entity repository, etc. Implementations may use the core content to provide information on entities related to the core content. For example, for main content about a tourist attraction (such as the Eiffel tower) implementations may provide generated content listing nearby hotels and/or restaurants, etc. As another example, for main content about a product, implementations may provide generated content describing related products or suggesting locations to purchase the product. Some implementations may provide a category of related entities as a suggested search. For example, a suggested search of "nearby restaurants" may be provided for main content relating to the Eiffel tower or a suggested search of "related products" may be suggested for main content related to a product.

In some implementations, the contextual search tool brings together multiple search tools. For example, the contextual search tool may bring together a multimodal search box and an image region search in a single user interface. Some implementations may also include one or more of the contextual suggestions in the single user interface. Contextual suggestions can include contextual search suggestions (queries) that are queries related to the core content. Some contextual suggestions can include generative content related to the core content. Contextual suggestions may include page summaries. The page summaries can be generated by a language model based on the core content. Some implementations may also include a dialog input area in the single user interface.

The contextual search tool includes a novel user interface and new browser functionalities. The novel user interface helps users organize, understand, and take action on Internet-based documents. In particular, the contextual search tool includes intelligence (i.e., one or more machine-learned models) that extracts core content from a resource (e.g., a website) and uses that core content in combination with a search service to get answers in context without navigating away from the original resource. The tool enables a user to find information with fewer resources (fewer provided inputs and less navigation). The contextual search tool can be surfaced in multiple ways and can be presented with varying levels of detail.

The browsers described herein can be executed within a computing device. For example, the browsers can be executed within a laptop device. In some implementations, the browsers can be executed within a mobile device. or on any other device with limited available screen space. Although many of the implementations shown and described herein are shown in landscape mode, any of the implementations described herein can be rendered in portrait mode. Likewise, implementations described herein in portrait mode can be rendered in landscape mode.

FIGS. **1**A and **1**B are diagrams that illustrate initiation of a contextual search tool in a contextual search area for content displayed within a display area of a browser, according to an implementation. FIG. **1**A is a diagram that illustrates a browser **110** displaying a resource W**1** within a display area **120** of the browser **110**. In some implementations, the display area **120** can be within a tab **112** of the browser **110**. The browser **110** includes an address bar area **114**. An address of the webpage W**1** can be displayed in the address bar area **114** (e.g., input address area **113**). The address bar area may include a user icon **111** representing a profile of a user associated with the browser window. In some implementations, the browser **110** may include tool icon **125**. The tool icon **125** may be a selectable control configured to open and display the contextual search tool. A request to open and display the contextual search tool may be considered a contextual search request. Although illustrated in the address bar area **114**, the tool icon **125** may be located anywhere in the address bar area **114**, including in the input address area **113**. Other controls, icons, and/or so forth can be included in the address bar area **114**. The address bar area **114** can be controlled by and/or associated with the browser **110** (e.g., the browser application). Because the address bar area **114** is controlled by the browser **110**, the webpage W**1** and/or a provider of the webpage W**1** does not have access to content displayed in the address bar area **114** or triggering actions provided by actionable elements of the address bar area **114**.

In response to selection of the tool icon **125**, the browser **110** may be configured to display a contextual search area **130** within the browser **110**, as illustrated in FIG. **1**B. In the example of FIG. **1**B, the address bar area **114** of the browser **110** and the contextual search area **130** may be part of a contiguous area. Put another way, the browser can render the contextual search area **130** as part of the browser-controlled address bar area **114**. This contiguous area (e.g., combined address bar area **114** and contextual search area **130**) can be

referred to as a browser search area. The browser search area is illustrated in FIG. **1**B by the gray color that is contiguous between the address bar area **114** and the contextual search area **130**.

The contextual search area **130** can be integrated as part of the browser **110** (e.g., address bar area **114**) in the browser search area so that the contextual search area **130** may not be spoofed (e.g., imitated) by, for example, a third party or the owner of the content of the webpage W**1** content. Because the contextual search area is under control of the browser, the contextual search area is distinct from the display area. Because the contextual search area **130** is part of the application of the browser **110**, the integration of the contextual search area **130** would be difficult to imitate by a provider of the content shown in the display area or another party not affiliated with the browser **110** (a third party). In some implementations, no clear separation (e.g., no separate line exists between the contextual search area **130** and the address bar area **114**. Because the contextual search area **130** and the address bar area **114** are contiguous, any background or theme applied to the address bar area **114** would flow into (and would be contiguous with) the contextual search area **130** (as illustrated by the gray area). The contiguous background would be difficult for a third party (e.g., provider of the webpage W**1**) to imitate within an application of the browser **110**. Moreover, the browser search area can be implemented as a security feature so that a user can distinguish legitimate search results provided by a search engine in response to a query from search results that can be inserted or manipulated by a third party or by the provider of the webpage.

Although not shown in FIG. **1**B, in some implementations, the contextual search area **130** is separated from the address bar area **114** by a visible separation line between the address bar area and the contextual search area **130**. The line can be eliminated (e.g., omitted), for security purposes. When provided, this is a line that a third party (e.g., provider of the webpage W**1**) may not remove (e.g., paint over, scrub out) the line. In other words, when provided, this is a line that is controlled (e.g., provided by, eliminated by) the browser **110** (e.g., browser application), similar to the address bar area **114**.

The combining of the contextual search area **130** and the address bar area **114** can be an indicator of the authenticity of the content in the contextual search area **130**. When the contextual search area **130** and the address bar area **114** are combined, it signifies that the browser **110** (or provider of the browser **110**) is providing the contextual search suggestions **138** in the contextual search area **130**. In some implementations, when a separating line is present between the contextual search area **130** and the address bar area **114**, results in the contextual search area **130** may be provided by an untrusted provider (e.g., a third party).

In some implementations, the contextual search area **130** can be triggered in response to selection of a menu option, e.g., from a menu displayed in response to selection of more options icon **108**. The triggering of the contextual search area **130** is a contextual search request. In some implementations, the contextual search area **130** can be triggered in response to selection of a menu option for a content item, such as a menu option displayed in response to right-clicking or long-pressing a word in text T**1** or an image I**1**. In one example, the user may have selected the tool icon **125** of FIG. **1**A. Thus, in response to interaction with the tool icon **125** in FIG. **1**A (i.e., in response to a contextual search request), the webpage W**1** is displayed within the display area **120'** in FIG. **1**B. Also in response to the selection of the tool icon **125** in FIG. **1**A (i.e., in response to a contextual search request), the contextual search area **130** is also rendered within the browser **110** in FIG. **1**B. Accordingly, in response to the selection of the tool icon **125** in FIG. **1**A, as illustrated in FIG. **1**B, both the webpage W**1** is displayed within the display area **120'** and the contextual search tool interface is rendered in the contextual search area **130** within the browser **110**. Display area **120'** differs from display area **120** of FIG. **1**A in size. In other words, display area **120'** occupies less area on the display than display area **120** to make room for contextual search area **130** but is otherwise the same as display area **120**. Consistent with the description above, rendering of the contextual search area **130** in FIG. **1**B can also be triggered in other ways, for example via a menu option.

As shown in FIG. **1**B, in some implementations, the contextual search tool interface can include a pop out control **136**. The pop out control **136** may be a selectable control configured to, in response to being selected, cause the content currently displayed in the contextual search area **130** to replace the main content of W**1** in the display area **120** and close the contextual search area **130**. In some implementations, the contextual search tool interface may include a close control **135**. The close control **135** may be a selectable control configured to, in response to being selected, cause the browser **110** to remove (e.g., clear) the contextual search area **130**. In some implementations, removal of (e.g., clearing) the contextual search area **130** automatically returns the display area **120'** to display area **120**. The UI design includes visual means to clearly separate the contextual search area **130** from the display area **120**, such that the contextual search area **130** can be recognized as part of the intrinsic functionality and user interface of the browser, i.e. provided by the browser implementation, whereas content and a user interface shown in the content area **120** are obtained and rendered from external content which is, e.g. loaded in the form of a webpage from an external web server.

The contextual search tool interface may also include a search box **132**. A user may initiate a query by typing the query into the search box **132**. In some implementations, the search box **132** may act as a conversation input box. For example, some implementations may provide the input from the search box **132** to a generative language model, which provides a generated response to the input. In some implementations, the contextual search tool interface may include a voice input control **133**. The voice input control **133** may be configured to, in response to being selected, cause the browser to receive a voice recording, convert the voice recording to text, and initiate a search using the text as the search query.

In some implementations, the contextual search tool may include a region search control **134**. The region search control **134** may be configured to, in response to being selected, enable the user to select a portion of the content in the display area **120'** and use the selected portion to initiate a query. Put another way, the region search control **134** may enable a user to select an image, a portion of the image, or a frame of a video from the webpage W**1** and to initiate a search using the image. In some implementations, the region search control **134** may enable the user to define an initial image search and the search box **132** may be configured to enable the user to further define the image search. For example, if a region of the content of W**1** is selected, the search box **132** may show an image of the selected content. In this example, the search box **132** may include a refinement control that enables the user to crop the initial image (e.g., the region originally selected) and submit a follow-on

query. Search results from a query submitted (sent to a search engine) in the search box **132** are displayed in the contextual search area **130** and do not replace the main content (the content of W**1**) in the display area **120'**.

As is known, a search result page is generated by a search engine in response to a query. The search result page includes search results and can include other content, such as ads, knowledge panels, short answers, other types of rich results including generated content, links to limit the search to a particular resource type (e.g., images, travel, shopping, news, videos, etc.). Each search result corresponds to a resource available via a network, e.g., via a URL/URI/etc. The resources were determined to be responsive to the query by the search engine. The search result includes a link to its corresponding resource. The search result can include additional information, such as a title, a snippet (text obtained from the content of the resource), an image associated with the resource, etc., or other information relevant to the resource and/or the query, as determined by the search engine. Conventionally, a browser displays the search result page in the display area. When a query is issued from the contextual search area **130**, implementations may display the search results in the contextual search area **130** instead of the display area **120'**. In some implementations, the content of a search result (the kind, length, etc.) may be different based on a query submitted via the contextual search area **130** than from a search engine home page or the input address area **113**. In some implementations, a ranking of the search results in a search result page may differ based on the query being issued from the contextual search area **130** and/or with the core content. Put another way, in some implementations, the search engine may use the core content in ranking results.

In the example of FIG. **1**B, the contextual search area **130** includes contextual search suggestions **138**. The contextual search suggestions **138** represent queries relevant to the content of webpage W**1**. Put another way, the contextual search suggestions **138** represent queries selected by the contextual search tool as relevant and/or helpful for understanding or discovering additional information about the main content displayed in display area **120'**. The contextual search suggestions **138** are determined using core content extracted from the main content, i.e., the content of webpage W**1** of FIG. **1**A. In some implementations, the contextual search suggestions **138** are determined prior to receiving a user-provided query. Put another way, in some implementations, an initial contextual search area **130** may include suggestions for a user's search determined based on the core content without user-provided input. In some implementations, although not shown in FIG. **1**B, additional contextual search suggestions **138** may be viewed via scrolling the contextual search area **130**.

In some implementations, the core content is identified by analyzing the document object model (DOM) for the main content. In some implementations, the core content is identified by analyzing an accessibility tree for the main content. In some implementations, the core content is identified by analyzing the DOM and the accessibility tree for the main content. In some implementations, the core content is non-third-party content. For example, advertisement content may be excluded from the core content. In some implementations, user input is excluded from the core content. For example, if the main content includes any input controls (e.g., text boxes, drop-down boxes, etc.) the content associated with the input controls may be excluded from main content. In some implementations, sensitive content may be excluded from core content. For example, content that is adult content or content related to financial information (e.g., a website listing bank account information) may be excluded from core content. In some implementations, user content may be excluded from core content. For example, user birthdates, names, identifiers, etc. may be excluded from core content. In some implementations, a machine-learned model may be used to identify the core content. For example, a DOM and/or an accessibility tree may be provided to the model and the model may determine the core content. The model is a model that runs on the client device. Thus, core content is determined on the client device.

FIG. **1**C illustrates example main content corresponding to FIG. **1**A. FIG. **1**D illustrates an example contextual search area **130** with example contextual search suggestions **138** for the example main content of FIG. **1**C. FIG. **1**D may thus correspond to FIG. **1**B. In some implementations, the contextual search area **130** of FIG. **1**D may be generated by the browser **110** in response to selection of the tool icon **125** of FIG. **1**C. In the example of FIG. **1**D, various entities have been identified (in text and images of webpage W**1**) and the contextual search suggestions **138** are related to the entities. In addition, some searches are suggested based on images identified in the content of W**1**. Because the contextual search suggestions **138** and entities are determined without user input, one or more models may be used to determine which images and/or which portions of an image a user is most likely to use in a search given the page context (e.g., the core content). One or more models may be used to determine which entities a user is most likely to search on given the page context (e.g., the core content). In some implementations, the model(s) may consider one or more of the following factors: the size of an image, the content of an image, the category of the core content (e.g., product, hotel, restaurant, business homepage, blog, etc.), the URL of the resource, the file type, Exchangeable Image File Format of the image, text associated with the image (e.g., a caption and/or accessibility text added by the accessibility tree, a file path of the image, a relative location of the image in the viewport, a relative location of the image in the resource, a relative size of the image compared to other images in the page, a relative size of the image compared to other images in the page, whether the image is a hot-linked image (hosted at a site that is not the site of the main content), etc.

In the example of FIG. **1**B, a suggested search SQ**1** is a suggestion to find similar sofas. The sofa is identified in the image I**1** of the webpage W**1**. Other suggested searches include a search of user-generated content (e.g., reviews) for a particular product mentioned in the content of the webpage W**1**. As another example, a suggested search includes a search for a category of sofa identified in the content of webpage W**1**. As another example, a suggested search includes a search of images with looks similar to I**1**. As another example, a lamp has been identified in image I**1** and a suggested search includes a search for lamps similar to the identified lamp. Other example suggested searches are illustrated in FIG. **1**D, all related to the main content in the display area **120'**. The queries can be suggested by a query suggestion service in response to receiving the core content, as described in more detail with regard to FIG. **5**. In some implementations, the suggested searches may be ranked (ordered) based on features of the core content. For example, the suggested searches may be ranked based on a category determined for the core content. As another example, the suggested searches may be ranked based on an anticipated user action or actions for the core content. As another example, the suggested searches may be ranked based on a category of an entity identified in the core content. As

another example, the suggested searches may be ranked based on placement or prominence of an entity in the core content.

FIG. **1**E illustrates an example contextual search area displayed in response to selection of SQ**1** of FIG. **1**D. Thus, FIG. **1**E illustrates that a search initiated within the contextual search area **130** does not replace the content of the display area **120'**. Instead, the contextual search suggestions **138** are replaced by search results **158**. A back control **156** may cause the contextual search suggestions **138** to be rendered. Selection of one of the search results **158** may replace the webpage W**1** with content represented by the resource associated with the selected search result. The content of a search result of the search results **158** may be based on a category of the resource.

FIG. **1**F illustrates an example browser interface displayed in response to selection of the region search control **134** in FIG. **1**D. In response to selection of the region search control **134**, the browser may enable the user to select a region of the main content (of webpage W**1**) via region selector **160**. The region selector **160** may be any method of identifying a region of the main content. Although illustrated as a rectangular shape, the region selector **160** may be any shape, e.g., a circular shape, an oval shape, a triangular shape, or a free-form shape. In some implementations, a user may use a predetermined gesture to indicate what portion of the image to search. In one example, a user may place an input device (e.g., cursor, finger, stylus, etc.) in the main content and drag diagonally or draw a circle, oval, etc. to identify the region to be selected. In one example, the browser may put a default region selector **160** on a portion of the main content and the region selector **160** may have a size control **162** that changes a size of the region selector **160**. The region selector **160** may be moved from one location to another. Any portion of the main content within the boundaries of the region selector **160** may be used as an image search.

In some implementations, the browser **110** may perform object segmentation on an image in the main content. In some implementations, the object segmentation may be performed in response to selection of the region search control **134**. In some implementations, the object segmentation may be performed in response to presentation of the contextual search area **130**, e.g., in response to selection of the tool icon **125**. In object segmentation, the pixels in the image are assigned to a class. Each image may have multiple classes. Classes can correspond to a particular entity. Classes may not correspond to a particular entity, but the pixels may be understood to belong to the same type of thing (class). In such implementations, the browser may make the segments (the different classes) selectable, e.g., the segments may act as the region selector **160**. For example, an object segmentation model may be used to analyze the image I**1** of FIG. **1**F. As a result, several object segments may be recognized, such as the lamp, the sofa, the floor, the curtains, and the table. Rather than having to click and drag the region selector **160** to select the table illustrated in FIG. **1**F, a user may hover over the table and the browser **110**, in response to detecting the hover input, may change an appearance of the region of the image I**1** corresponding to the table. For example the browser **110** may change the appearance of the region so that a dashed line outlines the table. This outline may indicate that the portion of the image I**1** represented by the table is selectable, e.g., as the region selector **160**. In such an implementation, if the user selects (e.g., clicks/taps on) the portion of the image outlined in dashed lines, that portion of the image may be submitted as a query. FIG. **1**G illustrates an example browser interface generated in response to submission of the image search using the region selected in FIG. **1**F. In some implementations (not shown), query suggestions related to the region selector **160** may be provided in contextual search suggestions **138**.

FIG. **1**H illustrates an example browser interface with a condensed contextual search tool interface (i.e., a condensed contextual search area) generated in response to initiation of the contextual search tool, as disclosed herein. For example, the condensed contextual search tool interface may be generated in response to selection of tool icon **125** of FIG. **1**C, in response to a menu option, e.g., from selection of a menu generated in response to selection of more options icon **108**, etc. Thus, the dialog input area **170** can be generated under any conditions where the contextual search tool is initiated. The condensed contextual search area may include a dialog input area **170**. The dialog input area **170** provides the user an opportunity to provide a question about the main content of the webpage W**1** prior to display of the contextual search area **130**. Thus, dialog input area **170** is similar to the search box **132** described above, in that a user can type a query into the dialog input area **170**. In some implementations, the query may provide a prompt into the dialog input area **170**. In some implementations, the input into the dialog input area **170** may be considered a query and a prompt. In such implementations, search results may be determined for the input as a query and generated content may be returned for the input as a prompt. Dialog input area **170'** illustrates an example of a prompt provided by the user as input. In some implementations, the dialog input area **170** may include a voice input control **133**, as described above, for providing the prompt. In some implementations (not shown), the dialog input area **170** may include a region search control **134**, as described above. In some implementations, the condensed contextual search area may include a region search instruction **172**. The region search instruction **172** may provide the user with an indication that the user can select a region of the displayed main content of the webpage W**1** for searching. The selection of the region can be done in any manner described with respect to FIG. **1**F. This selected content may be provided to the contextual content engine. In some implementations, the selected content may be provided as a prompt input. In some implementations, this selected content may be provided in addition to a prompt input provided in the dialog input area **170**. In some implementations, there is no region search instruction **172** and it is implied that a user can select a region of the displayed main content of the webpage W**1**. In some implementations, the contextual search tool may cause the browser to display a transparent overlay over the main content of the webpage W**1** as part of the condensed contextual search area. The transparent overlay may be removed when a region is selected to indicate which portion of the main content has been selected for searching.

FIG. **1**I illustrates an example contextual search area with example contextual content and contextual suggestions generated from a prompt provided in FIG. **1**H, e.g., as illustrated in dialog input area **170'**, according to an implementation. In the example of FIG. **1**I, the contextual search area **130** may be an overlay interface. In an overlay interface the contextual search area **130** is still integrated as part of the browser **110** so that the contextual search area **130** may not be spoofed (e.g., imitated) by, for example, a third party or the owner of the content of the webpage W**1** content. However, with an overlay interface some of the content of the webpage W**1** is obscured by the contextual search area **130**. Although the contextual search area **130** of FIG. **1**I and the address bar

area **114** are not contiguous, any background or theme applied to the address bar area **114** also flows into the contextual search area **130**, so that it is clear the contextual search area **130** is associated with the contextual search tool provided by the browser and not with a content provider.

In the example of FIG. **1**I, the contextual search tool has provided two contextual search suggestions **138**. Additional contextual search suggestions **138** may be viewed, e.g., by scrolling the content in the contextual search area **130**. In the example of FIG. **1**I, the contextual search tool has provided search results **175**. The search results **175** may include generated content. The generated content may be considered a contextual suggestion. For example, the prompt of dialog input area **170'** may be provided to a generative language model with the core content extracted from the webpage W**1**. The prompt of the dialog input area **170'** be denormalized before being processed by the generative language model or as part of being processed by the generative language model. Thus, for example, "this chaise" in the prompt (or query) may be denormalized to refer to the Relaxer 2-piece chaise offered for sale by the content provider of the webpage W**1**. In some implementations, the generative language model may return generated content as a contextual suggestion that reflects (summarizes) reviews for the Relaxer 2-piece chaise offered by the content provider of webpage W**1**. In some implementations, the content of actual reviews (e.g., top-rated, most helpful, most recent) reviews may be provided as the search results **175**.

Although discussed in the context of a webpage W**1**, in some implementations, the content rendered in the display area **120'** may not be a webpage. As discussed herein, the content may be associated with any resource accessible via a network or a resource saved on the user's device. Thus, in some implementations, the content displayed in the display area **120'** can be in an image, a link, a video, text, a PDF file and/or so forth.

FIGS. **2**A and **2**B are diagrams that illustrate another variation of initiation of a contextual search tool in a contextual search area **130** for content displayed within a display area **120** of a browser **110**, according to an implementation. In the example of FIG. **2**A, website W**2** is the source of the main content displayed in the display area **120** of the browser **110**. The website W**2** is a news source, e.g., a social media site, a news aggregation site, etc. The website W**2** includes a post P**1** and a post P**2** in the viewable area (e.g., the display area **120**), but only a portion of the post P**2** is visible. The website W**2** may have many additional posts not included in the display area **120**. In some instances, the website W**2** may be an infinite scrolling site. In other words, as a user scrolls down the website W**2** may fetch additional posts, so that the user never hits an end of page. The website W**2** may also have non-core content C**1** and non-core content C**2**. The non-core content C**1** and C**2** may represent advertisements, suggestions, or other content that may or may not be related to the post P**1** or the post P**2**. Non-core content C**1** and C**2** can be examples of content excluded from the core content extracted for website W**2**.

In response to a user selecting the tool icon **125**, the browser may render the main content in display area **120'** and render the contextual search tool in contextual search area **130**, as described above. The controls of the contextual search tool are similar to those described with regard to FIG. **1**B. The contextual search suggestions **238** may be similar to the contextual search suggestions **138**. However, because the context of the content has changed, the contextual search suggestions **238** may differ in nature from the contextual search suggestions **138**.

In some implementations, although not shown in FIG. **2**B, additional contextual search suggestions **238** may be triggered via a scrolling input, e.g., scrolling or otherwise navigating through the main content in display area **120'** in FIG. **2**B. Put another way, the browser **110** may be configured to determine when the main content rendered in the display area **120'** (the viewport) has changed (e.g., is 60% new, is 75% new, when a new post is fully rendered in the display, etc.) in response to a user action (a scrolling input) and trigger the contextual search tool, which may re-extract the core content and generate a new set of contextual search suggestions **238**. In other words, as a user scrolls the posts of the webpage W**2**, the browser **110** may detect the scrolling input and may change the contextual search suggestions **238** in the contextual search area **130** to match the content currently displayed. In some implementations, this may include re-ranking and/or re-ordering the contextual search suggestions so that a contextual search suggestion not previously provided (or not previously in the viewport of the contextual search area **130**) is visible. In some implementations, this may include re-determining (re-extracting) the core content and submitting a new request to the contextual content engine to receive new contextual search suggestions **238**. In some implementations, this may include re-submitting the request to the contextual content engine with an indication of the core content that corresponds to the main content now in the viewport to receive new contextual search suggestions **238**.

FIG. **2**C illustrates example main content for a webpage W**2** corresponding to FIG. **2**A. In the example of FIG. **2**C, the content C**1** is recommendation content generated by the provider of the website W**2** and the content C**2** may be an advertisement not generated by the provider of the website W**2**. Both C**1** and C**2** may be excluded from core content used to generate contextual search suggestions **238**. FIG. **2**D illustrates an example contextual search area **130** with example contextual search suggestions **238** corresponding to FIG. **2**B, according to an implementation. The contextual search suggestions **238** differ in type from the contextual search suggestions **138** because the underlying core content differs.

FIG. **2**E is a diagram illustrating a contextual search area with a result of a contextual search query selected in FIG. **2**D. For example, a user may select the suggested search SQ**2** of FIG. **2**D and the browser may submit a query if "news on protecting the Great Barrier Reef" to a search engine. In response to receiving a search result for the query, the browser may display the search result page **236** in the contextual search area **130**, as illustrated in FIG. **2**E. Thus, the search result page **236** replaces the contextual search suggestions **238** with a search result page **236**. In some implementations, the items in the search result page **236** may be different than those returned for the same query when the results are rendered in the display area **120** instead of the contextual search area **130** because the contextual search area **130** has less room for display than display area **120**.

FIG. **2**F is a diagram illustrating an updated display area and an updated contextual search area generated in response to selection of a search result in the contextual search area of FIG. **2**E. In the example of FIG. **2**E, webpage W**3** replaces webpage W**2** in the display area **120** because webpage W**3** is the resource associated with the selected search result. In the example of FIG. **2**F the contextual search area **130** is not closed, but is updated using the content of the webpage W**3**. In other words, in some implementations, the browser **110** may keep the contextual search area **130**, extracting the core content of webpage W**3**, providing that core content to a

search service to obtain additional contextual suggestions relevant to the core content of webpage W3. In some implementations, however, the browser may close contextual search area **130** and restore display area **120'** to display area **120** in response to selection of a search result. In some implementations, the browser **110** may maintain the search result page **236** in the contextual search area **130**.

In the example of FIG. **2**F, the contextual search area **130** includes a page description **242**. The page description **242** may follow any contextual search suggestions **238** for the webpage W3. The page description **242** may be triggered by a control (not shown). In some implementations, the page description may be some or all information about the webpage provider taken from an authoritative source, e.g., a WIKIPEDIA page, an "about" section from a directory, etc. In some implementations, content may be selected using a model. In some implementations, a generative model may be used to generate the page description **242**. The page description **242** represents details about the source of the webpage W2.

FIGS. **3**A and **3**B are diagrams that illustrate another variation of a contextual search tool in a contextual search area for content displayed within a display area of a browser, according to an implementation. In the example of FIGS. **3**A and **3**B, the contextual search tool includes generative content that is generated using the context of the main content (e.g., the core content). In FIG. **3**A, website W4 is the source of the main content displayed in the display area **120** of the browser **110**. The website W4 may include content not currently displayed in the display area **120**. In some instances, the website W4 may be an infinite scrolling site, which always has additional content not currently displayed in the display area **120**.

In response to a user selecting the tool icon **125**, the browser may render the main content in display area **120'** and render the contextual search tool in contextual search area **130**, as described above. The controls of the contextual search tool are similar to those described with regard to FIGS. **1**B and **3**B. In the implementation of FIG. **3**B, the contextual search tool includes several examples of contextual suggestions, such as generated content **360**, local suggestions **348** (LQ**1** and LQ**1**) and contextual search suggestions **338** (SQ**1** and SQ**2**). The generated content **360** may be a summary of the main content generated by a generative language model. For example, the core content may be provided as input to a generative language model, which generates the summary and provides it as generated content **360**. In some implementations, suggested searches may be generated based on other content in the webpage W4 or based on sources the generative language model used to generate the response. These are illustrated as LQ**1** and LQ**2** in FIG. **3**B. Other contextual search suggestions SQ**1** and SQ**2**, as described herein, may also be provided in the contextual search area **130**. In some implementations, one or more of the contextual search suggestions SQ**1** or SQ**1** and/or LQ**1** or LQ**2** may be queries related to facts presented in the generated content **360**.

FIG. **3**C illustrates example main content corresponding to FIG. **3**A. FIG. **3**D illustrates an example contextual search area with example generated content **360**, local search queries LQ**1** and LQ**2**, and contextual search suggestions SQ**1** and SQ**2** corresponding to FIG. **3**B, according to an implementation.

FIG. **3**E is a diagram illustrating a contextual search area **130** with a result of a contextual search query LQ**1** selected in FIG. **3**D. LQ**1** is a query relating to how the movie discussed in the main content of the display area **120** was received. Like FIG. **3**D, the contextual search area **130** of FIG. **3**E includes generated content GC**2** and GC**3**. In addition, the browser **110** changes the appearance of (e.g., highlights, underlines, etc.) content from the website W4 (e.g., underlined section **340***a*, underlined section **340***b*) relevant to the query (LQ**1**) and generates a summary of the reactions from sources available via the Internet.

In some implementations (not shown), the contextual search area **130** may include a dialog input area, similar to dialog input area **170** of FIG. **1**H. In some implementations, the search box **132** may be the dialog input area. In some implementations, the contextual search area **130** may include a separate dialog input area. Using the dialog input area the user may initiate a dialog with a generative language model, e.g., by entering a prompt input. A benefit of disclosed implementations is that the browser **110** may be configured to provide the core content of the display area **120'** in addition to the text (prompt) provided by the user via the dialog input area to the language model. Thus, the core content becomes part of the dialog context. This enables a user to ask questions about the core content and can also help the language model provide a more relevant generated response. As with other disclosed implementations, the core content may be determined at the client device, so that certain information displayed in the display area **120'** is excluded from the core content, as discussed herein. The dialog context may include the prompt, the core content, and any prior prompts and generated content that precede the current prompt. This dialog context may be denormalized before being processed by the generative language model or as part of being processed by the generative language model. Thus, for example, a current prompt of 'what style is the picture on the left' may be denormalized to identify an image in the display area to the left of another image, and formulate a prompt that analyzes the style of that image. Likewise, a prompt of "where can I buy this" can be denormalized to identify a main entity referred to in the core content and/or in a selected region. In some implementations, with user permission, attributes about the user may be included in the context. For example, a user's location may be used to return retail stores within a specified radius of the user's general location when generating a response for the "where can I buy this" prompt. A response generated by the generative language model is provided as a response to the current prompt and becomes part of the dialog context. In some implementations, the dialog context is limited to a predetermined number of prior prompts and responses.

FIG. **4**A illustrates a contextual search tool in a contextual search area **130** on a device with a limited display area. The contextual search tool can be any of the implementations described above with respect to FIGS. **1**A through **1**I, **2**A through **2**F, and/or **3**A through **3**E but because the screen is smaller than the screen illustrated in these prior figures, the contextual suggestions may include fewer suggestions, may be represented differently, and/or include fewer different kinds of elements. The contextual search area **130** of FIG. **4**A may be partially hidden initially. In other words, the contextual search area **130** of FIG. **4**A may be an overlay window (e.g., similar to contextual search area **130** of FIG. **1**I) that is initially only partially visible. FIG. **4**B illustrates a contextual search area **130** with an overlay window expanded. The contextual search area **130** of FIG. **4**B is still an area separate from the display area **120'** but within the browser **110**. FIG. **4**C illustrates an example contextual search area corresponding to FIG. **4**A, and FIG. **4**D illustrates an example contextual search area corresponding to FIG. **4**B, according to an implementation. Although the

contextual search area **130** illustrated in FIGS. **4**A through **4**D as an overlay window at the bottom of the display area **120'**, implementations include an overlay window at either side or at the top of the display area **120'**. In some implementations, the location of the overlay window may be dependent on a device type and/or an orientation of the device. The contextual search area **130** can also be an overlay window on a device without limited display area.

In some implementations the contextual search area **130** of any of the figures described above can include one or more feedback controls. Feedback controls may be used to collect, with user permission, preference information. Preference information can include information about user interactions with suggestions. A feedback control is an interactive user interface element used to collect direct feedback, which can be recorded as preference information. A feedback control may enable a user to dismiss a suggestion. Dismissing a suggestion may be interpreted as negative feedback for (negative user interaction with) the suggestion. A feedback control may be an interactive user interface element that enables a user to indicate support for a suggestion. The interaction can be with any kind of suggestion, including additional queries, generated content, search results, or any other content presented in the contextual search area **130**. In some implementations, the user interaction information may include user selection of a suggestion. This can be interpreted as positive feedback for (a positive user interaction with) the suggestion. In some implementations the browser may provide a user interface for a user to provide preference information. Such preference information may include favored resource providers (e.g., favored merchants, favored news sites, favored social media sites and/or favored influencers on a social media site, etc.). Such preference information may include favored attributes for particular entity categories and/or particular categories of resources. For example, a user may provide favored attributes for shoppable resources, such as price, review ratings, and/or dimensions, etc.; a user may provide favored attributes for celebrities; etc. In some implementations, the user interface for providing preference information may include controls for indicating preference for certain types of suggestions and/or for dismissing entirely certain types of suggestions.

In some implementations, with user permission, the preference information may be recorded, e.g., in a user preference file. In some implementations, the preference information may be provided with the core content and used to determine the context suggestions. In some implementations, the preference information may be used to further train a model, such as the context suggestions may be based, at least in part, on the user preference file. In some implementations, with user permission, one or more models may be further trained (fine-tuned) using the preference information. In some implementations, preference information may lack any information identifying a particular user. For example the preference information may pair a resource with selected suggestions and/or dismissed suggestions. The system may use this user-agnostic preference information to fine-tune a model, such as a contextual context engine, to favor (keep, up-rank) selected context suggestions and disfavor (filter out, down-rank) dismissed suggestions.

FIG. **5** illustrates a system **500** including a computing system **502** and a search server **540** configured for implementing the concepts and various implementations shown and described herein. The computing system **502** can be a computing device with a limited screen size, such as a smartphone, a smart watch, smart (e.g., A/R or V/R glasses), a tablet, etc. The computing system **502** can be a computing device with a larger screen size, such as a desktop computer, a laptop, a netbook, a notebook, a tablet, a smart TV, a game console, etc., that runs a browser. In general, the computing system **502** can represent any computing device that executes a browser. As shown in FIG. **5**, the computing system **502** is configured to communicate with the search server **540** and/or a resource provider **510** (e.g., a web server) via a network **550**. The computing system **502** includes at least a browser **520** and a search companion manager **523**. In some implementations, the browser **520** is configured to manage resource content, such as webpage content, provided by the resource provider **510** (e.g., a web server). In some implementations, the browser **520** is configured to operate as one of several applications **528** executed via an operating system (O/S) **529**. The browser **520** can be configured to implement portions of the user interface, contextual suggestions, search results, windows, browser areas, and/or so forth, as described in connection with the implementations described herein.

As shown in FIG. **5**, the computing system **502** includes several hardware components including a communication module **561**, one or more cameras **562**, a memory **563**, a central processing unit (CPU) and a graphics processing unit (GPU) **564**, one or more input devices **567** (e.g., touch screen, mouse, stylus, microphone, keyboard, etc.), and one or more output devices **568** (screen, speaker, vibrator, light emitter, etc.). The hardware components can be used to facilitate operation of the browser **520**, the search companion manager **523**, and/or so forth of the computing system **502**.

The browser **520** includes a user interface (UI) generator **521** configured to generate and/or manage the various user interface elements of a browser such as browser **110** as shown and described herein. For example, the UI generator **521** can generate UI elements including the various windows in the browser **110** such as the display area **120**, the contextual search area **130**, shown in at least FIGS. **1**A through **1**H, FIGS. **2**A through **2**F, FIGS. **3**A through **3**E, and FIGS. **4**A through **4**D.

The browser **520** includes a tab manager **522** configured to generate and/or manage the various tabs (e.g., tab **112**) of a browser such as browser **110**. The browser **520** may be configured to, amongst other things, provide/perform the actions associated with actionable controls, such as links in the contextual search suggestions **138**, **238**, **338**, generated content **360**, tool icon **125**, controls of the contextual search area **130**, such as voice input control **133**, region search control **134**, close control **135**, pop out control **136**, search box **132**, back control **156**, etc. The tab manager **522** can also be configured to provide the menu of actions and cause performance of an action selected from the menu of actions.

The browser **520** includes a search companion manager **523** configured to generate and/or manage content rendering such as content in the contextual search area **130** (as shown in at least FIGS. **1**B, **1**D, **1**E, **1**F, **1**I, **2**B, **2**D, **2**D, **2**E, **3**B, **3**D, **3**E, and **4**A through **4**D). The search companion manager **523** can also be configured to determine when to trigger display of the contextual search area **130**. Put another way, the search companion manager **523** can be configured to determine what events trigger rendering of the contextual search area **130** and whether the triggering event has occurred. Triggering events can include any of those discussed herein, such as selection of a tool icon (tool icon **125**), selection of an action from a menu of actions, receipt of a voice command, etc. In some implementations, the search companion manager **523** may determine whether to

display a condensed context search tool interface or the full context search tool interface (e.g., in a contextual search area **130**). In some implementations, the search companion manager **523** may include an object segmenter **525**. The object segmenter **525** may be configured to make different portions of the displayed main content of a resource selectable, e.g., by classifying the portions into different classes. Thus, for example, entities recognized in the main content may be assigned to a respective class. Even if an entity is not recognized, portions of the main content that are part of a same object may be assigned to a respective class. In such implementations, as a user hovers over an image the search companion manager **523** may provide an indication of the portion of the image included in the class. Such an implementation may make it easier for a user to ask questions about that part of the main content.

In some implementations, the search companion manager **523** can include core content extractor **524**. In some implementations, portions of the core content extractor **524** may be part of the browser process. In some implementations, the core content extractor **524** is not integrated into the search companion manager **523**. The core content extractor **524** may be configured to identify and extract core content from the main content of the displayed resource. In other words, the core content extractor **524** may be configured to identify which content associated with a resource displayed in the display area of a browser is core content. As described herein, the core content extractor **524** may take as input a DOM tree and/or an accessibility tree generated by the browser **520** for the resource and determine core content using the input. A benefit of using both a DOM tree and an accessibility tree is additional descriptive nodes in the accessibility tree for DOM elements such as images. A resource provider of the resource and/or a location (e.g., URL) of the resources may be considered core content. The core content extractor **524** may be configured to ignore or exclude certain elements from the core content. These elements can include user information, or in other words elements provided by a user (e.g., associated with input controls), elements describing a user (e.g., usernames, profile information, account numbers, etc.), etc. These elements can include sensitive information. Sensitive information may include age-restricted content (e.g., adult content, whether text or images). Sensitive information may include account information (e.g., a page from a financial institution). Thus, in some implementations, there may be little core content provided to the search server **540** because the majority of the core content is excluded by the core content extractor **524** based on a type of the resource (e.g., the resource is a sensitive resource). In some implementations, when a resource is determined to be a sensitive resource, not all features of the contextual search tool may be enabled. For example, generative content may be disabled for some or all sensitive types of sensitive resources. In some implementations, the core content extractor **524** may be a machine-learned model that executes on the computing system **502**. The model may be trained to detect the sensitivity of the resource. The model may be trained to determine what to extract based on the sensitivity. The model may be trained to exclude (e.g., ignore) certain types of information, such as user information, sensitive information.

The browser **520** can be configured to generate and/or manage content rendering associated with a resource (e.g., webpage W1) in the display area **120** (including display area **120'**), shown in the figures. The resource content can be provided to the computing system **502** by the resource provider **510**. The browser **520** and/or the search companion manager **523** can be configured to implement one or both of the processes, or portions of the processes, described in connection with FIG. **6**.

As shown in FIG. **5**, session data **527** (which can be stored in memory **563** (not shown)) can be managed as, or by, one of the applications **528**. The session data **527** can include data related to one or more browser sessions. The application information **526** can include information related to the various applications operating within and/or that can be executed by the O/S **529**.

As shown in FIG. **5**, the communication module **561** can be configured to facilitate communication with the resource provider **510** and/or search server **540** via the network **550** via one or more communication protocols. The camera **562** can be used for capturing one or more images, the memory **563** can be used for storing information associated with the browser **520** and/or search companion manager **523**, other applications **528**, O/S **529**, etc. The CPU/GPU **564** can be used for processing information and/or images associated with the browser **520** and/or search companion manager **523**. The computing system **502** also includes one or more output devices **568** such as communication ports, speakers, displays, and/or so forth. The functionality described in this application can be implemented based on one or more policies **565** and/or preferences **566** stored in the memory **563**.

FIG. **5** illustrates some aspects of the search server **540**. For example, the search server **540** includes one or more processors **546** (i.e., a processor formed in a substrate) and one or more memory devices **548**. The search server **540** includes a search engine **544** configured to receive a request for a search (a query), from the computing system **502**. The queries can include the search suggestions generated for and rendered in the contextual search area. The search engine **544** may be used to provide a search result page for a given query. A query can be a word, a phrase, multiple words, an image, a media file, etc., as is known. The search engine **544** is configured to search one or more data repositories for resources responsive to the query. Specifically, the search engine **544** may use an index of webpages, an index of images, an index of products, an entity repository, a news index, etc., to determine the content of the search result page. The search result page includes one or more search results, where each search result corresponds to a resource responsive to the query. Each search result includes a link to its respective resource. In some implementations, the search engine **544** can add additional elements to the search result page, such as ads, sponsored links, rich elements (knowledge panels, short answers, mini-apps, carousels, navigation links, etc.).

The search server **540** may also include a contextual content engine **542**. The contextual content engine **542** may be configured to determine contextual suggestions, generative content, etc., for a given resource context, i.e., core content. In some implementations, with user permission, the contextual content engine **542** may be configured to determine contextual suggestions based on preference information, e.g., stored in user preferences **566**. For example, the preference information (preference data) may be from a profile of a user may include user preferences considered when making contextual suggestions. In some implementations, the preference information (preference data) may be inferred from browsing history, with user permission. For example, the preference information may include actions taken by the user with respect to prior contextual suggestions. The actions can include selections of a prior contextual suggestion. The actions can include dismissal of a prior

contextual suggestion. In some implementations, the contextual content engine **542** may include (or may have access to) a contextual query generator **543**. The contextual query generator **543** may be configured to suggest searches (suggested queries) given an input, such as the core content and/or the location of the resource (the URL). The contextual query generator **543** may be configured to rank suggested searches (suggested queries) differently based on the request originating from the search companion manager **523** rather than from a search engine home page or from other applications **528** running on the computing system **502**. The contextual content engine **542** may be configured to generate page descriptions, e.g., such as page description **242** of FIG. **2**F. In some implementations, the page description may be generated by a content description generator **545**.

The contextual content engine **542** may include content description generator **545**. The content description generator **545** may be or may include a generative language model, also referred to as a large language model. Such generative language models can generate natural language responses to prompts, such as prompts entered into a search box or dialog input area. In some implementations, the content description generator **545** may include or have access to several different models. The content description generator **545** may be configured to take the core content as input and provide a generated summary for the core content. The generated summary may be a sentence or a few sentences. The content description generator **545** may be configured to generate more than one summary for the core content. The content description generator **545** can be configured to generate additional summaries. The additional summaries may be about one or more entities (topics) identified in the content. The additional summaries may be about one or more entities (topics) related to entities identified in the content. For example, rather than suggesting a search for related products, the content description generator **545** may generate a summary about related products. As another example, the content description generator **545** may generate a summary about reviews about related products. The content description generator **545** may be configured to generate answers to a prompt about the core content, e.g., a prompt entered in a dialog input area. The content description generator **545** can be configured to generate creative content related to the core content. For example, math problems, a poem, a party menu, party ideas, etc., can be generated and provided by the content description generator **545** in response to a prompt. Although illustrated as part of the search server **540**, in some implementations, one or more components of the contextual content engine **542** may be implemented at the computing system **502**.

The content description generator **545** may be configured to add annotations (e.g., footnotes) to the generated summaries. The annotations may be actionable, e.g., so that selecting a footnote causes the content in the display area of the browser to scroll or causes a resource to be displayed in the contextual search area. In some implementations, the content description generator **545** may be configured to suggest searches. Thus, the content description generator **545** or the contextual query generator **543** may suggest additional searches. The content description generator **545** may be configured to take as input a dialog context, which includes the core content, and provide a generated response in return. The generated response may also include annotations. The generated response may include additional search suggestions.

FIG. **6** is a flowchart that illustrates an example method **600** of performing at least some of the concepts described herein in the various figures. Many elements of the method **600** can be implemented by the system shown in at least FIG. **5**. In particular, the method **600** can be performed by a browser, (e.g., browser **520**) of a computing system **502**. The example method **600** is an example of triggering display of the contextual search area (contextual search area **130**) in response to a contextual search request. The contextual search request can be triggered by the user, e.g., via interactions with an icon, a menu option, etc. At step **602**, the system may extract core content from the main content of a resource. The main content may be represented by a DOM tree. The main content may be represented by an accessibility tree. The main content may be represented by a DOM tree and an accessibility tree. The core content can be identified as content provided by an entity associated with the resource, or in other words, content hosted at a domain associated with the resource as opposed to content provided from a source not associated with the domain. Put another way, core content may exclude content associated with an entity that is not the content provider of the resource (e.g., excluding advertising content). The main content can be identified as content in the viewport, or in other words currently visible to the user. The main content can be identified as any content in the DOM tree and/or accessibility tree regardless of whether it is in the viewport. In some implementations, content in the viewport may be indicated as such in the core content (extracted content). This may give the visible content more weight (a higher weight) in determining the contextual suggestions, e.g., contextual search suggestions and/or generated content. As discussed herein, some content may be excluded from the core content based on the type of information (e.g., user information, sensitive information, etc.) At step **604** the core content is provided to a contextual content engine, e.g., at search server **540**. The contextual content engine uses the core content to generate contextual suggestions.

At step **606** the contextual suggestions are received from the contextual content engine. The contextual suggestions may include generated summaries. The contextual suggestions may include suggested searches. The contextual suggestions may include page descriptions. The types of suggestions included may be determined by a category of the resource. For example, different types of suggestions may be provided for a resource categorized as a shopping resource than a resource categorized as a news article or a resource about a celebrity. Similarly, the information included in a suggestion may be based on the category of a resource. The suggestions can be ordered based on the category of a resource. The suggestions can be ordered based on anticipated user actions for the category of a resource. In some implementations, a user may customize the types of suggestions included for a category of resource and/or the type of information included in a suggestion. For example, a user may provide a preference for certain merchants, certain news sites, certain social networks, certain attributes of entities (e.g., price and dimensions for products, etc.), etc. At step **608** the system may display the contextual suggestions in a contextual search area that is outside of the display area but within the browser. The display of the contextual search area may cause the display area to shrink in size, e.g., to make room on the display for the contextual search area. In some implementations, the contextual search area may be an overlay window that can overlay the display area. The contextual search area is considered outside the display area whether it is displayed concurrently with the display area or as an overlay window.

Once the contextual search area is displayed, the user may interact with the content of the contextual search area. For example, suggested searches displayed in the contextual search area may be actionable (selectable). At step **610**, the system may receive a selection of a suggested search. At step **612**, in response to the selection, the system may provide the selected suggested search to a search engine. The search engine may use the suggested search as a query and may provide a search result. The system may, in response to receiving the search result, render the search result page in the contextual search area. Thus, the search can be accomplished without navigating away from the main content. In some implementations, selection of a search result may trigger fetching and rendering content for a new resource (the resource associated with the selected search result) in the display area. In some implementations, method **600** starts over at step **602** with the new resource.

As another example, the contextual search area may include a region search control. The region search control enables a user to select a portion of the displayed content (including all of or a portion of a displayed image). At step **614** a selection of the region search control is received. At step **616** the system provides a region selector that enables a user to designate a selected portion of the displayed content. At step **618** the selected region is provided to a search engine. In response, the search engine provides a search result page. The search result page is displayed in the contextual search area. As in step **612**, selection of a search result may trigger fetching and rendering content for a new resource (the resource associated with the selected search result) in the display area. In some implementations, method **600** starts over at step **602** with the new resource. In some implementations, the system may provide a refinement tool. The refinement tool may enable a user to further crop the selected portion and resubmit a query for the cropped portion.

Some implementations may include a prompt input in the contextual search area. At step **620**, the system may receive a prompt input from the user, e.g., from a dialog input area and/or from a search box. At step **622** the system may obtain a generated response for the prompt input by providing a dialog context to a generative language model. The dialog context includes not only the prompt input, but also the core content. In some implementations, the dialog context can include prior prompt input and generated responses related to the displayed resource. The core content provides context for the generative language model in generating a response to the prompt. The system may display the response to the prompt in the contextual search area. In some implementations, a change in the resource displayed in the display area clears out a dialog and signals a new dialog.

FIG. **7** is a flowchart that illustrates an example method **700** of performing at least some of the concepts described herein in the various figures. Many elements of the method **700** can be implemented by the system shown in at least FIG. **5**. In particular, the method **700** can be performed by a browser, (e.g., browser **520**) of a computing system **502**. The example method **700** is an example of triggering display of the contextual search area (e.g., contextual search area **130**) in response to a contextual search request. The contextual search request can be triggered by the user, e.g., via interactions with an icon, a menu option, etc. At step **702** the system may receive a prompt input for the contextual search. The prompt input can be any natural language text provided by the user, e.g., via a dialog input area. The prompt input can be normalized, e.g., to replace pronouns. In some implementations, the normalization may be based, at least in part, on core content. In some implementations, receiving the prompt input can be a selected portion of the main content. The selected portion may be an object identified in an image of the main content, e.g., by an object segmenter. In some implementations, the selected portion can be a region selected via a click-and-drag gesture or a circling gesture, or some other region selector.

At step **704**, the system may extract core content from the main content of a resource in response to receiving the contextual search request. The main content may be represented by a DOM tree. The main content may be represented by an accessibility tree. The main content may be represented by a DOM tree and an accessibility tree. The core content can be identified as content provided by an entity associated with the resource, or in other words, content hosted at a domain associated with the resource rather than content provided from a source not associated with the domain. Put another way, core content may exclude content associated with an entity that is not the content provider of the resource (e.g., core content may represent non-advertising content). The main content can be identified as content in the viewport, or in other words currently visible to the user. The main content can be identified as any content in the DOM tree and/or accessibility tree regardless of whether it is in the viewport. In some implementations, content in the viewport may be indicated as such in the core content. This may give the visible content more weight in determining the contextual suggestions, such as contextual search suggestions and/or generated content. As discussed herein, some content may be excluded from the core content based on the type of information (e.g., user information, sensitive information, etc.)

At step **706**, the system may provide the prompt (including the portion of the image selected, if one exists) and the core content to a generative language model. The generative language model can be part of a contextual content engine. The generative language model may use the prompt and the core content to generate a response to the prompt. The response may be generated content based on the core content. The core content may be used as dialog context for the prompt. The response may include information about the core content, such as information about an entity identified in the core content. The response may include creative content. The response is based on the prompt. The response can include contextual suggestions. In some implementations, the response can include generated content and search results based on the prompt.

At step **708** the system receives the response and displays the response in a contextual search area. The contextual search area is outside of the display area of the browser but within the control of the browser. The contextual search area may be an overlay interface that partially obscures the display area. The contextual search area may be at an edge of the display area and may cause the display area to shrink in size, e.g., to make room on the display for the contextual search area. The contextual search area is considered outside the display area whether it is displayed concurrently with the display area or as an overlay window.

Once the contextual search area is displayed, the user may interact with the content of the contextual search area and/or submit another prompt, as described with respect to steps **610** to **622** of FIG. **6**.

The contextual search tool discussed above can be used to provide additional context in various settings. In one example, a user may be browsing a news item from a news source, such as a social media site, a news feed, a publishing website, etc. The contextual search tool can provide the user

a broader context for a news item, validate the authenticity of images, explore contrasting viewpoints, and/or access the credibility of the source. In another setting, a traveler reading a travel blog may be able to get reviews, find geographic information, and/or make reservations. In another setting, a shopper may use the contextual search tool to identify products in images, compare multiple products, synthesize user reviews, find deals on an item, etc. In another context, a student doing homework may be able to get related educational content, view step-by-step instructions on how to solve a problem, ask related questions to deep dive on a topic, and get multiple points of view. Implementations can support other types of journeys.

Various implementations of the systems and techniques described herein can be realized in digital electronic circuitry, integrated circuitry, specially designed ASICs (application specific integrated circuits), computer hardware, firmware, software, and/or combinations thereof. These various implementations can include implementation in one or more computer programs that are executable and/or interpretable on a programmable system (e.g., computer-implemented methods) including at least one programmable processor, which may be special or general purpose, coupled to receive data and instructions from, and to transmit data and instructions to, a storage system, at least one input device, and at least one output device.

These computer programs (also known as programs, software, software applications or code) include machine instructions for a programmable processor, and can be implemented in a high-level procedural and/or object-oriented programming language, and/or in assembly/machine language. As used herein, the terms "machine-readable medium" "computer-readable medium" refers to any computer program product, apparatus and/or device (e.g., magnetic discs, optical disks, memory, Programmable Logic Devices (PLDs)) used to provide machine instructions and/or data to a programmable processor, including a machine-readable medium that receives machine instructions as a machine-readable signal. The term "machine-readable signal" refers to any signal used to provide machine instructions and/or data to a programmable processor.

To provide for interaction with a user, the systems and techniques described herein can be implemented on a computer having a display device (e.g., a CRT (cathode ray tube), LED (light emitting diode), or LCD (liquid crystal display) monitor) for displaying information to the user and a keyboard and a pointing device (e.g., a mouse or a trackball) by which the user can provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback (e.g., visual feedback, auditory feedback, or tactile feedback); and input from the user can be received in any form, including acoustic, speech, or tactile input.

The systems and techniques described herein can be implemented in a computing system that includes a back end component (e.g., as a data server), or that includes a middleware component (e.g., an application server), or that includes a front end component (e.g., a client computer having a graphical user interface or a Web browser through which a user can interact with an implementation of the systems and techniques described herein), or any combination of such back end, middleware, or front end components. The components of the system can be interconnected by any form or medium of digital data communication (e.g., a communication network). Examples of communication networks include a local area network ("LAN"), a wide area network ("WAN"), and the Internet.

A number of implementations have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the disclosed implementations.

In addition, the logic flows depicted in the figures do not require the particular order shown, or sequential order, to achieve desirable results. In addition, other steps may be provided, or steps may be eliminated, from the described flows, and other components may be added to, or removed from, the described systems.

Clause 1. A computer-implemented method, comprising: receiving a contextual search request relating to main content, the main content being displayed in a display area of a browser; extracting at least some content from the main content; receiving a contextual suggestion associated with the at least some content; and as a response to the contextual search request, causing display of the contextual suggestion in a contextual search area within the browser.

Clause 2. The method of clause 1, wherein the contextual suggestion is based on a category of the main content that is determined based on the at least some content.

Clause 3. The method of clause 1 or clause 2, wherein the contextual suggestion is one of a plurality of contextual suggestions and the plurality of contextual suggestions are ordered based on a category of the main content that is determined based on the at least some content.

Clause 4. The method of clause 1, wherein the contextual suggestion is one of a plurality of contextual suggestions and the plurality of contextual suggestions are ordered based on a category of an entity identified in the at least some content.

Clause 5. The method of clause 1, wherein the contextual suggestion is a search suggestion and the method further comprises: receiving a selection of the search suggestion; obtaining a search result page using the search suggestion as a query; and causing display of the search result page in the contextual search area.

Clause 6. The method of clause 5, further comprising: receiving a selection of a search result from the search result page; fetching second main content for a resource associated with the search result; extracting second content from the second main content; receiving a second contextual suggestion associated with the second content; and causing display of the second contextual suggestion in the contextual search area.

Clause 7. The method of clause 1, wherein the contextual suggestion is determined based on the at least some content and on preference information.

Clause 8. The method of any of clauses 1 to 7, wherein the at least some content is identified by a model using a document object model for the main content as input.

Clause 9. The method of any of clauses 1 to 7, wherein the at least some content is identified by a model using an accessibility tree for the main content as input.

Clause 10. The method of any of clauses 1 to 7, wherein the at least some content is identified by a model trained to exclude user information from the at least some content.

Clause 11. The method of any of clauses 1 to 10, wherein the at least some content is identified by a model trained to exclude information provided by an entity not associated with a provider of the main content from the at least some content.

Clause 12. The method of clause 1, wherein the contextual suggestion includes generated content describing an entity identified in the at least some content.

Clause 13. The method of clause 1, wherein the contextual suggestion is a suggested search related to an entity identified in the at least some content.

Clause 14. The method of clause 1, wherein the contextual suggestion is a description of the main content.

Clause 15. The method of any of clauses 1 to 14, further comprising: detecting a scrolling input; and in response to detecting the scrolling input, changing the contextual suggestion based on the main content in a viewport of the display area.

Clause 16. The method of clause 15, wherein changing the contextual suggestion includes: re-extracting content from the main content now in the viewport; and receiving a contextual suggestion associated with the re-extracted content.

Clause 17. The method of clause 15, wherein the contextual suggestion is a first contextual suggestion of a plurality of contextual suggestions and changing the contextual suggestion includes: re-ordering the plurality of contextual suggestions based on the scrolling input; and replacing the first contextual suggestion with a second contextual suggestion of the plurality of contextual suggestions based on the re-ordering.

Clause 18. The method of any of clauses 1 to 17, wherein the at least some content includes an indication of content that is visible in a viewport.

Clause 19. The method of clause 18, wherein the content that is visible in the viewport has a higher weight in determining the contextual suggestion than content not visible in the viewport.

Clause 20. A computer-implemented method, comprising: receiving a contextual search request for main content, the main content being displayed in a display area of a browser; receiving a prompt input; extracting content from the main content; receiving generated content based on the prompt input and the extracted content; and causing display of the generated content in a contextual search area that is within the browser.

Clause 21. The method of clause 20, further comprising: receiving a selected region of the main content, wherein the selected region is used as the prompt input.

Clause 22. The method of clause 21, wherein the selected region is a region determined to correspond to an object and receiving the selected region includes: detecting a hover input over the region; in response to detecting the hover input, changing an appearance of the region during the hover input; and receiving a selection of the region.

Clause 23. The method of any of clauses 20 to 22, further comprising: providing a condensed contextual search area with a dialog input area, wherein the prompt input is received in the dialog input area.

Clause 24. The method of any of clauses 20 to 23, wherein the generated content includes a search suggestion and the method further comprises: receiving a selection of the search suggestion; sending a query associated with the search suggestion to a search engine; receiving a search result page for the query; and causing display of the search result page in the contextual search area.

Clause 25. The method of clause 24, further comprising: receiving a selection of a search result from the search result page; fetching second main content for a resource associated with the search result; extracting second content from the second main content; receiving a contextual suggestion associated with the second content in response to providing the content to the search engine; and causing display of the contextual suggestion in the contextual search area.

Clause 26. The method of any of clauses 20 to 25, wherein the generated content is determined based on the extracted content, the prompt input, and preference information.

Clause 27. The method of any of clauses 20 to 26, wherein the extracted content is extracted by a model using a document object model for the main content as input.

Clause 28. The method of any of clauses 20 to 26, wherein the extracted content is extracted by a model using an accessibility tree for the main content as input.

Clause 29. The method of any of clauses 20 to 28, wherein the extracted content is identified by a model trained to exclude user information from the extracted content.

Clause 30. The method of any of clauses 20 to 29, wherein the extracted content is identified by a model trained to exclude information provided by an entity not associated with a provider of the main content from the extracted content.

Clause 31. The method of any of clauses 20 to 30, wherein the prompt input identifies an entity and the generated content includes information about the entity.

Clause 32. The method of any of clauses 20 to 31, further comprising: receiving contextual search suggestions based on the extracted content; and causing display of the contextual search suggestions with the generated content in the contextual search area.

Clause 33. The method of any of clauses 20 to 32, wherein the generated content relates to an entity identified in the extracted content.

Clause 34. A computing device comprising: a processor formed in a substrate; and a memory storing instructions that, when executed by the processor, cause the computing device to perform the method of any of clauses 1 to 33.

What is claimed is:

1. A computer-implemented method, comprising:

receiving a contextual search request relating to main content, the main content being displayed in a display area of a browser;

extracting at least some content from the main content;

receiving a contextual suggestion associated with the at least some content; and

as a response to the contextual search request, causing display of the contextual suggestion in a contextual search area within the browser.

2. The method of claim **1**, wherein the contextual suggestion is based on a category of the main content that is determined based on the at least some content.

3. The method of claim **1**, wherein the contextual suggestion is one of a plurality of contextual suggestions and the plurality of contextual suggestions are ordered based on a category of the main content that is determined based on the at least some content.

4. The method of claim **1**, wherein the contextual suggestion is a search suggestion and the method further comprises:

receiving a selection of the search suggestion;

obtaining a search result page using the search suggestion as a query;

causing display of the search result page in the contextual search area;

receiving a selection of a search result from the search result page;

fetching second main content for a resource associated with the search result;

extracting second content from the second main content;

receiving a second contextual suggestion associated with the second content; and

causing display of the second contextual suggestion in the contextual search area.

5. The method of claim **1**, wherein the at least some content is identified by a model trained to exclude user information from the at least some content.

6. The method of claim **1**, wherein the at least some content is identified by a model trained to exclude information provided by an entity not associated with a provider of the main content from the at least some content.

7. The method of claim **1**, wherein the contextual suggestion includes generated content describing an entity identified in the at least some content.

8. The method of claim **1**, wherein the contextual suggestion is a suggested search related to an entity identified in the at least some content.

9. The method of claim **1**, wherein the contextual suggestion is a description of the main content.

10. The method of claim **1**, further comprising:

detecting a scrolling input; and

in response to detecting the scrolling input, changing the contextual suggestion based on the main content in a viewport of the display area.

11. The method of claim **10**, wherein changing the contextual suggestion includes:

re-extracting content from the main content now in the viewport; and

receiving a contextual suggestion associated with the re-extracted content.

12. The method of claim **10**, wherein the contextual suggestion is a first contextual suggestion of a plurality of contextual suggestions and changing the contextual suggestion includes:

re-ordering the plurality of contextual suggestions based on the scrolling input; and

replacing the first contextual suggestion with a second contextual suggestion of the plurality of contextual suggestions based on the re-ordering.

13. The method of claim **1**, wherein the at least some content includes an indication of content that is visible in a viewport, wherein the content that is visible in the viewport has a higher weight in determining the contextual suggestion than content not visible in the viewport.

14. A computer-implemented method, comprising:

receiving a contextual search request for main content, the main content being displayed in a display area of a browser;

receiving a prompt input;

extracting content from the main content;

receiving generated content based on the prompt input and the extracted content; and

causing display of the generated content in a contextual search area that is within the browser.

15. The method of claim **14**, further comprising:

receiving a selected region of the main content,

wherein the selected region is used as the prompt input.

16. The method of claim **15**, wherein the selected region is a region determined to correspond to an object and receiving the selected region includes:

detecting a hover input over the region;

in response to detecting the hover input, changing an appearance of the region during the hover input; and

receiving a selection of the region.

17. The method of claim **14**, further comprising:

providing a condensed contextual search area with a dialog input area,

wherein the prompt input is received in the dialog input area.

18. The method of claim **14**, wherein the generated content includes a search suggestion and the method further comprises:

receiving a selection of the search suggestion;

sending a query associated with the search suggestion to a search engine;

receiving a search result page for the query; and

causing display of the search result page in the contextual search area.

19. The method of claim **18**, further comprising:

receiving a selection of a search result from the search result page;

fetching second main content for a resource associated with the search result;

extracting second content from the second main content;

receiving a contextual suggestion associated with the second content in response to providing the content to the search engine; and

causing display of the contextual suggestion in the contextual search area.

20. The method of claim **14**, wherein the generated content is determined based on the extracted content, the prompt input, and preference information.

21. The method of claim **14**, wherein the extracted content is identified by a model trained to exclude user information from the extracted content.

22. The method of claim **14**, wherein the extracted content is identified by a model trained to exclude information provided by an entity not associated with a provider of the main content from the extracted content.

23. The method of claim **14**, wherein the prompt input identifies an entity and the generated content includes information about the entity.

24. The method of claim **14**, further comprising:

receiving contextual search suggestions based on the extracted content; and

causing display of the contextual search suggestions with the generated content in the contextual search area.

25. The method of claim **14**, wherein the generated content relates to an entity identified in the extracted content.

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