(No Model.) 4 Sheets—Sheet 1.

G. B. TITSWORTH.

WEB ASSOCIATING AND FOLDING APPARATUS.

No. 576,007. Patented Jan. 26, 1897.

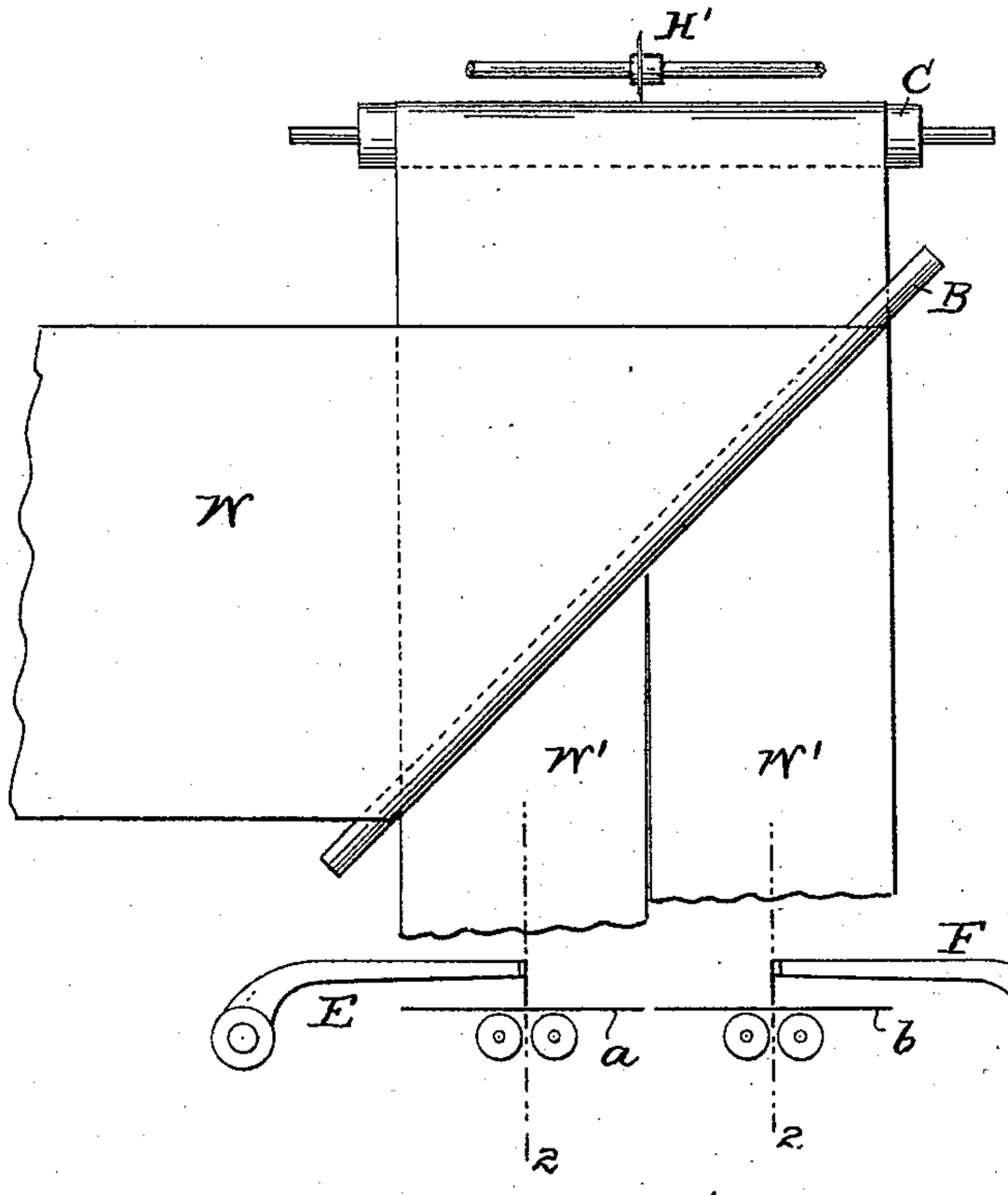

Fig. 1.

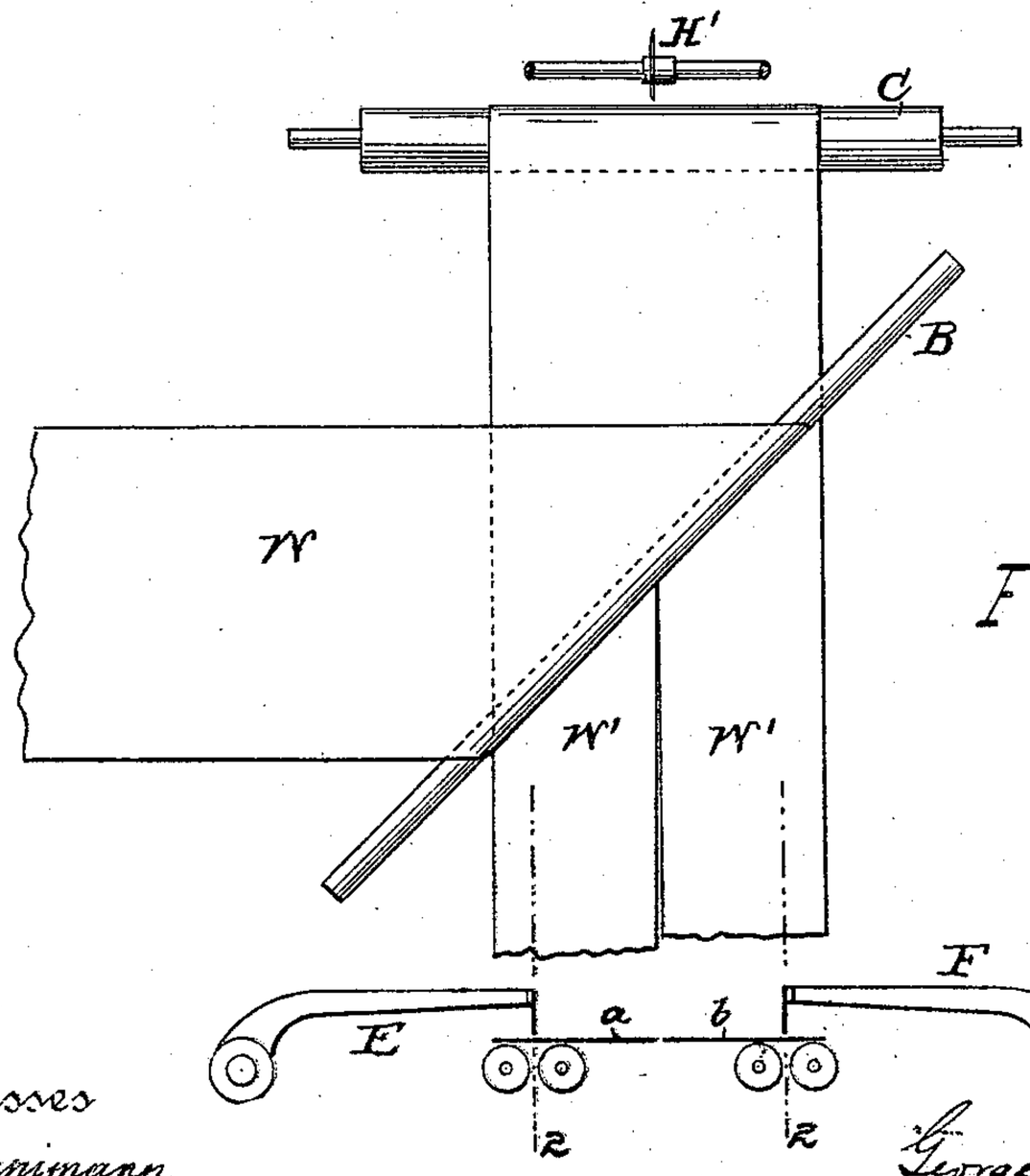

Fig. 2.

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(No Model.) 4 Sheets—Sheet 2.

G. B. TITSWORTH.

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Fig. 4.

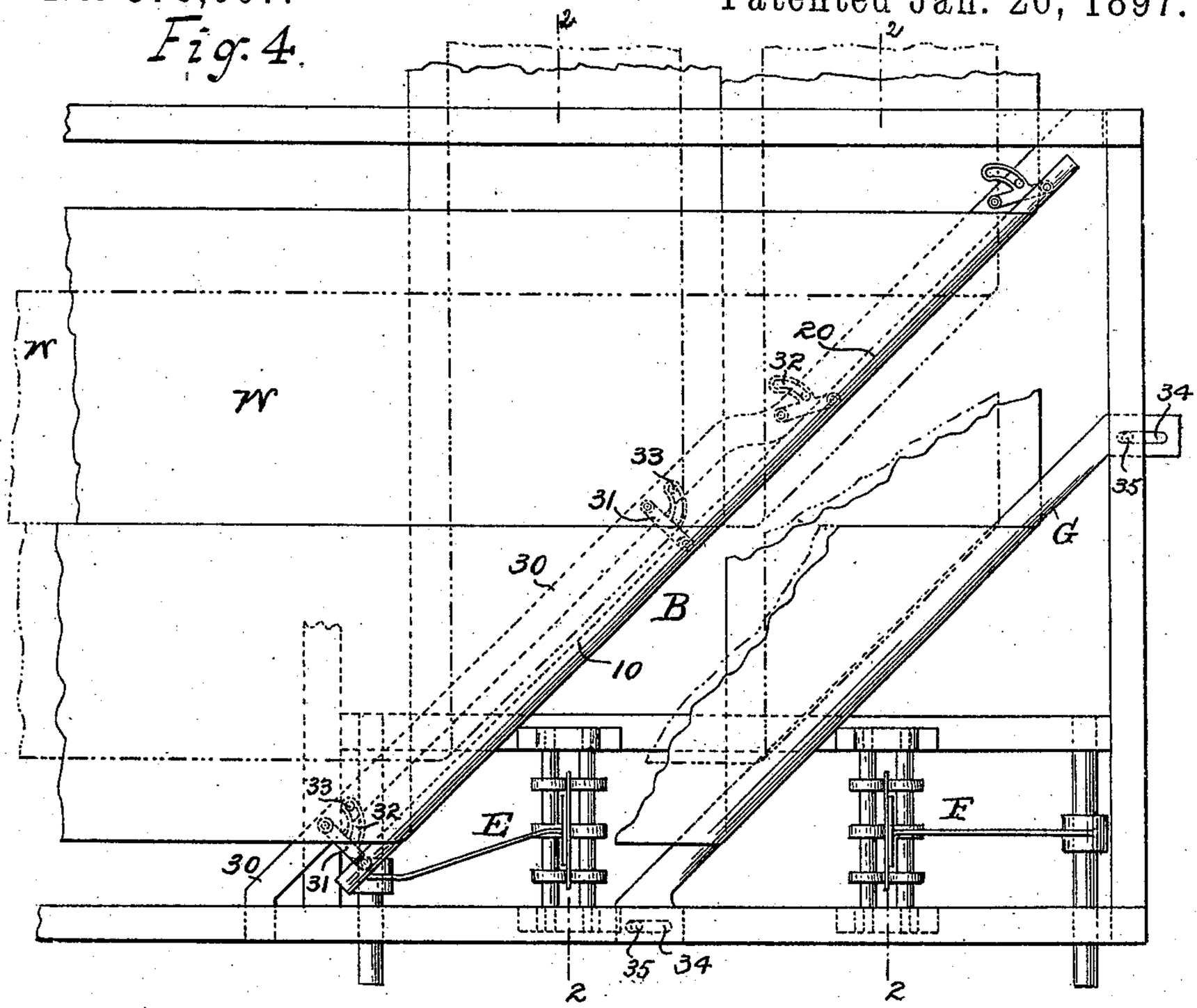
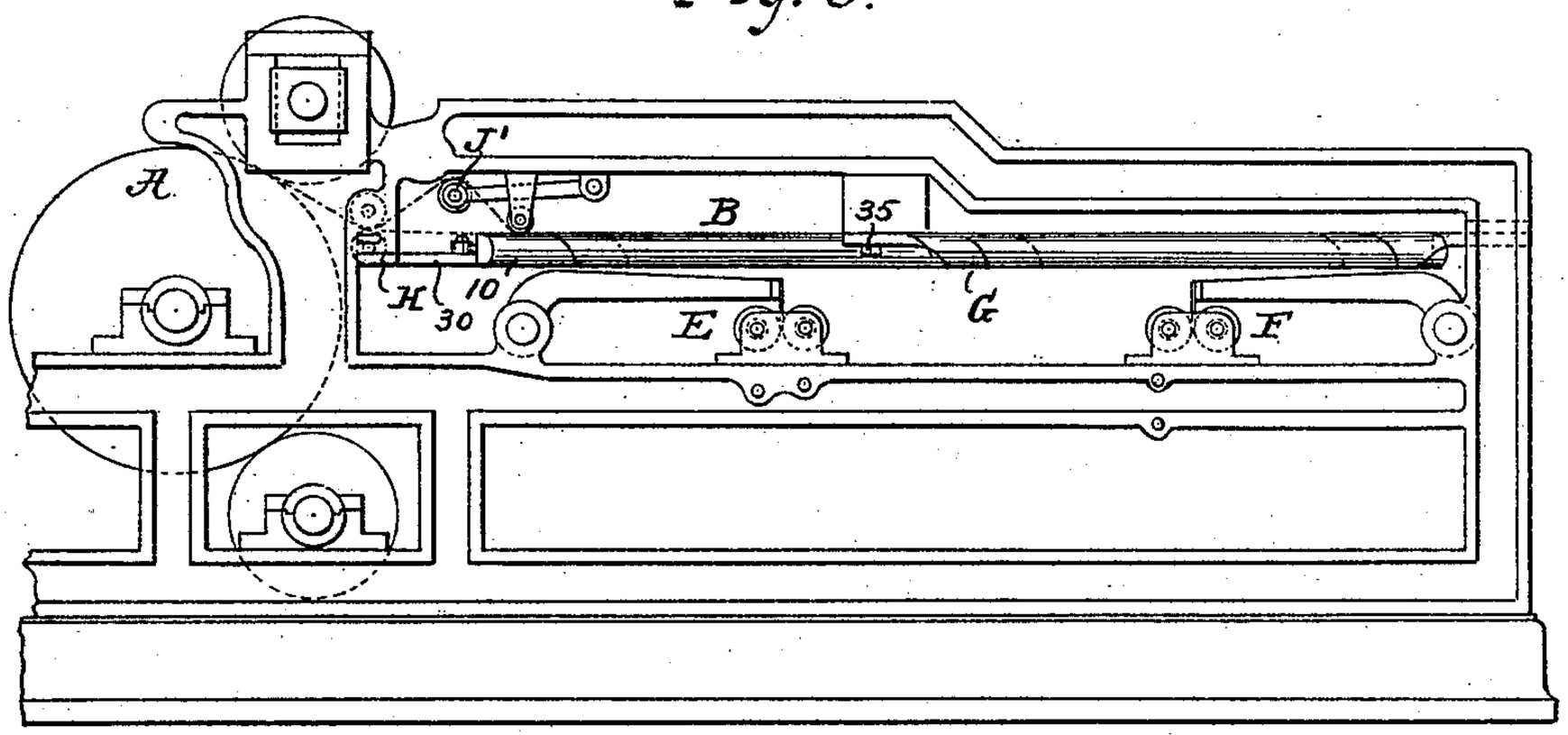


Fig. 3.



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(No Model.) 4 Sheets—Sheet 3.

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WEB ASSOCIATING AND FOLDING APPARATUS.

No. 576,007. Patented Jan. 26, 1897.

Fig. 5.

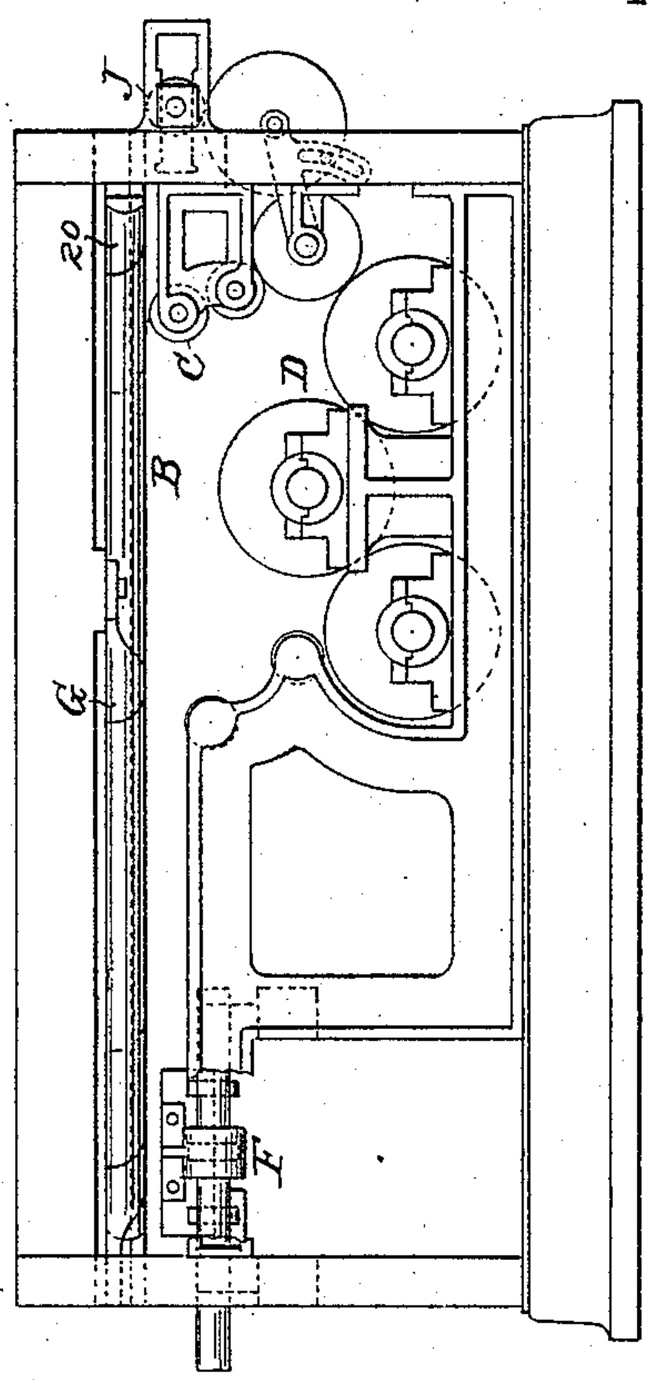
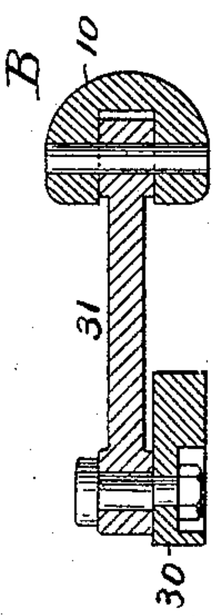


Fig. 6.



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(No Model.) 4 Sheets—Sheet 4.

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WEB ASSOCIATING AND FOLDING APPARATUS.

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Fig. 7.

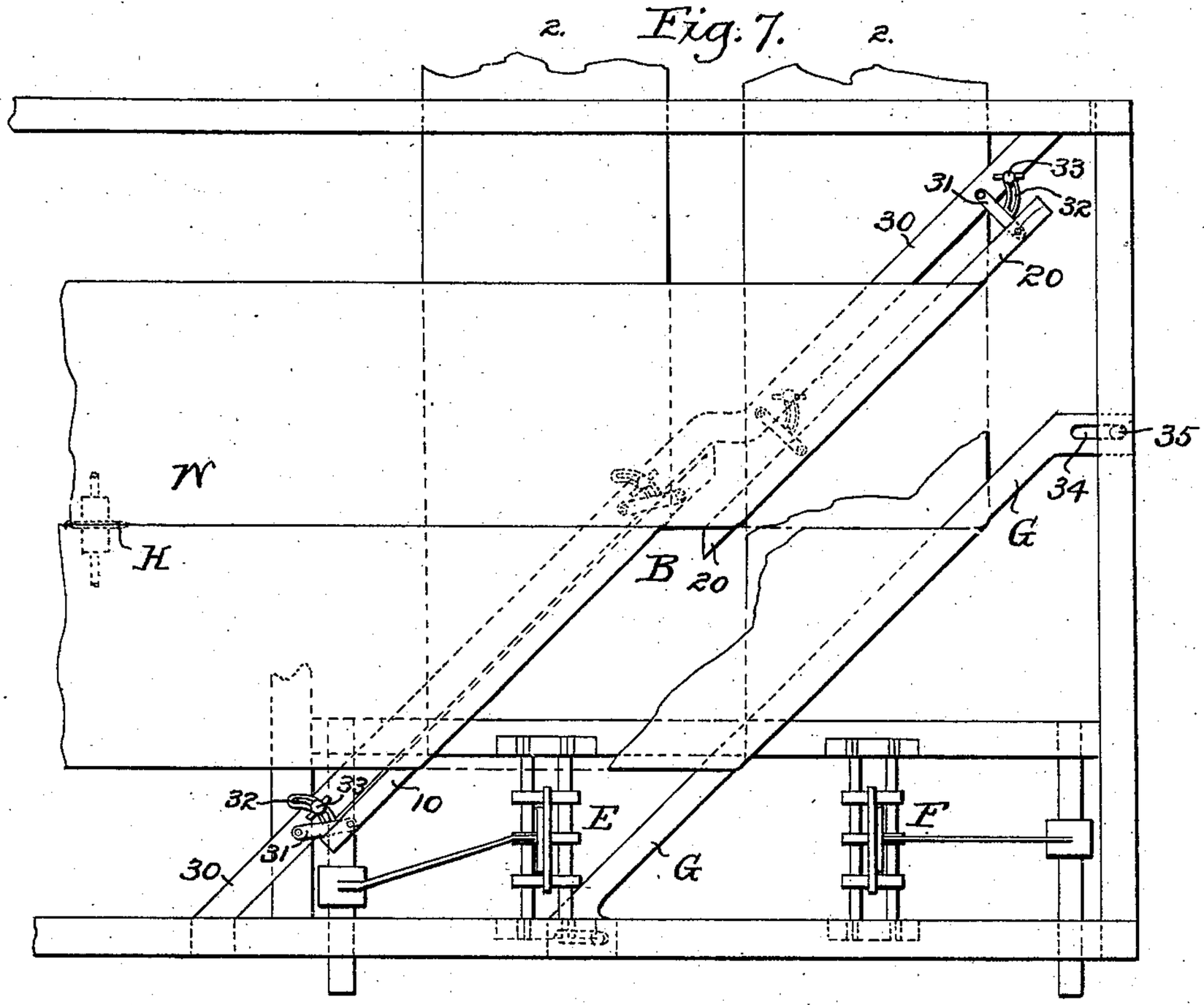


Fig. 8.

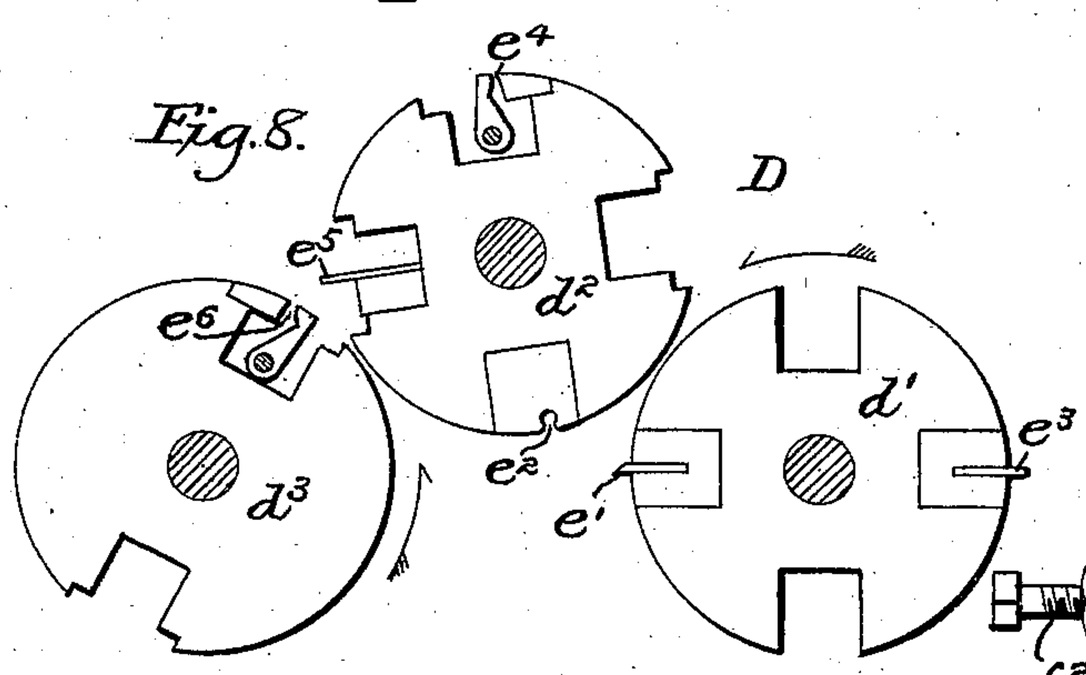


Fig. 9.

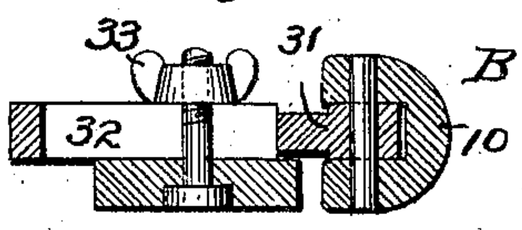
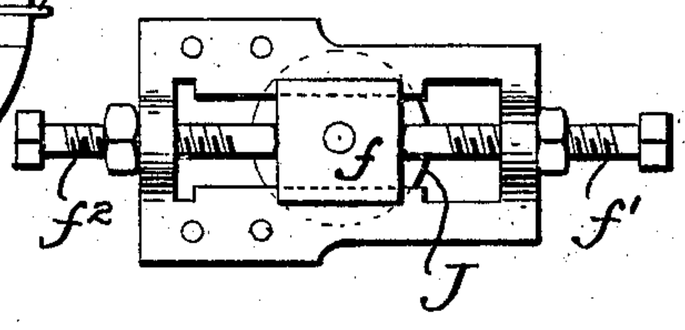


Fig. 10.



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BY
Edw. C. Graham
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE B. TITSWORTH, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO THE POTTER PRINTING PRESS COMPANY, OF SAME PLACE.

WEB ASSOCIATING AND FOLDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 576,007, dated January 26, 1897.

Application filed July 25, 1891. Serial No. 400,674. (No model.)

To all whom it may concern:

Be it known that I, GEORGE B. TITSWORTH, residing at Plainfield, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Web-Turners, fully set forth in the following description and represented in the accompanying drawings.

This invention relates generally to printing-machines, or to that class known as "web-printing" machines wherein the web before or after being printed on one or both sides is turned laterally from one course into another course for further operation; and it specifically relates to the turning bar or bars in such machines.

The object of the invention is primarily to adapt web-machines embodying a turning bar or bars so that any width web within the capacity of the machine may be used with equal facility.

To this end the present improvements consist in a two-part turning-bar, each part movable or adjustable in the same plane and in opposite directions; and it also consists in details of construction, all hereinafter fully set forth.

The accompanying drawings illustrate the invention as adapted to a web printing and folding machine, only so much of said machine being shown as is necessary to a proper understanding thereof.

In said drawings, Figures 1 and 2 are diagrams hereinafter referred to. Fig. 3 is a side elevation of the folding or delivery portion of the machine, the last plate and impression cylinder being indicated. Fig. 4 is a plan view thereof. Fig. 5 is an end view of the same, the several cutting and folding cylinders being indicated in outline. Fig. 6 is a detail section of the turning-bar, its supporting-bar, and connecting-link. Fig. 7 is a plan view similar to Fig. 4 with the turning-bars adjusted to a different position. Fig. 8 is an enlarged diagram of the combined cutting and folding cylinders. Fig. 9 is an enlarged sectional elevation through the supporting-bar, turning-bar, and slotted link, illustrating one mode of adjustment of the turning-bar. Fig. 10 is a detailed elevation of the means for adjusting one of the rollers around which the web is led.

The drawings illustrate a portion of a web-printing machine wherein the web after being printed upon is led, for instance, from the second impression-cylinder A directly to a turning-bar B, thence laterally around a roller C to combined cutting and folding cylinders D, and by tapes (not shown) to vibrating folders E F, from which the folded sheets may be delivered, or, before delivery, directed to other folding devices, as is common in this class of machines.

The turning-bar B is adapted to support the full-width web that the machine is capacitated to handle and turn it bodily in a lateral direction for further manipulation; and associated with this turning-bar there may be another turning-bar G for use when the web is split longitudinally, and thus divided into two half-width webs, so that one of the half-width webs may be directed under the other and be registered with each other by one of the half-webs passing around an adjustable roller J, and be thus what is termed "associated." The full-width web may be split longitudinally either before or after it is turned by the turning-bar, it being usually preferable when two half-width webs are not to be associated to split the full-width web after it has been turned, but when two half-width webs are to be associated the full-width web is split longitudinally immediately before passing to the turning-bar.

In cases where the web or divided webs after being turned by the turning-bar are directed to other web or sheet manipulating devices, such as folding, collecting, or packing devices, as well as addressing or wrapping devices, such devices are necessarily located with respect to a predetermined line of travel of the web or webs, or of the sheets that are severed from the web or webs, so that such devices may act upon the same with accuracy and certainty.

As it is often desirable in this class of machines or in other web-machines to adapt the several web or sheet manipulating devices to operate with equal facility and accuracy whether the full-width web be of the

maximum size or of any other lesser size, it has heretofore been necessary to adjust the position of said manipulating devices according to the size of web employed in the machine, so that whatever width web is used said devices will be in position to accurately operate upon the web or webs or the sheets severed from the webs. This necessity will be apparent from an examination of the diagrams Figs. 1 and 2. In Fig. 1 the full or maximum width web W is led around the turning-bar B, turned laterally, and doubled around the roller C, where, for instance, it may be split longitudinally by a rotating slitter H', thence conveyed to cutting-cylinders (not indicated) to divide the web or half-width webs W' W' into sheets *a b*, which in turn are led to vibrating folders E F. These folders are arranged so that the fold imparted to the sheets will be exactly midway of their width, as, for instance, upon the dotted line 2, longitudinal and central of the half-width webs W' W'. Now if it be desired to similarly manipulate a web of less width, as shown in Fig. 2, such web will be turned by the bar B as before, conveyed around roller C, and split longitudinally by the slitter H', conveyed through the cutting-cylinders, (not shown,) so as to divide the two half-width webs into sheets, and if the vibrating folders E F be in the same position they were when the machine was manipulating a full or maximum width web said folders will fold the sheets *a b* at one side of their central line 2 and deliver a faulty and possibly unmerchantable product. The present invention to obviate this faulty operation employs, in lieu of the single turning-bar usually employed, a two-part or duplex bar 10 20, (see Figs. 3 to 5,) adapted in one position to register with one another, with their longitudinal axes in line, so as to present a continuous turning-surface, or in other positions to present separated or independent turning-surfaces for each portion of the web, the web in such latter case being divided longitudinally before passing over the separated turning-surfaces. In the position shown in Fig. 4 the separate or independent turning-bars 10 20 are arranged in alinement with their contiguous ends abutting, so as to act as a single turning-bar and form a continuous turning-surface for the maximum-width web, which may or may not have been previously split longitudinally by the usual slitter. In dotted lines in said figure and in full lines, Fig. 7, is also illustrated a web of lesser width leading over the same turning-bar, but in this case the web is divided longitudinally by the usual slitter H before passing to the turning-bars, and the turning-bars have been moved so that the bar 10 occupies a position inward of its first position, while the bar 20 occupies a position outward from its former position. The two half-width webs are led over these bars in said adjusted positions, and turned laterally thereby, so that instead of their contiguous edges lying together, as formerly, they are separated a distance apart equal to the difference between the width of the narrower-width web and the maximum-width web.

If it be assumed that the manipulating devices, as, for instance, the vibrating folders E F, are positioned so as to impart ultimate folds to the sheets severed from these webs on the central or fold lines 2, Figs. 4 and 7, it will be seen that said line will be the common midway or central point of the maximum-width web or sheet as well as that of the narrower-width web or sheet, so that whatever the width of the web to be operated upon in the machine may be less than the maximum-width web the turning-bars 10 20 need only be adjusted to cause such narrower-width webs to occupy a position necessary to effect the accurate manipulation of the succeeding devices, such as the folders E F in the machine.

In the present instance the maximum-width web, either divided longitudinally before or after passing the turning-bar, will be led around the roller C, and thence to the combined cutting and folding cylinders D, thereby severing it into sheets and folding the sheets transversely one or more times, and conveyed by tapes or other suitable mechanism to the vibrating folders E F, and be thereby folded accurately upon a central line and from thence delivered or otherwise manipulated.

The combined cutting and folding cylinders, (see Fig. 8,) of a well-known construction, consist of three cylinders d' d^2 d^3, the cylinder d' having a cutting-blade e', adapted to coöperate with a slot e^2 in the cylinder d^2, and also having a folding-blade e^3, coöperating with a nipping-jaw e^4 in the cylinder d^2, whereby the web or associated webs are cut transversely and folded centrally by the blade e^3 into the nipping-jaw e^4, whereby the folded sheet is carried onward by the cylinder d^2. This cylinder also carries a folding-blade e^5, that coöperates with a pair of nipping-jaws e^6 in the cylinder d^3, so that the once-folded sheet is then again transversely folded in passing between the cylinders d^2 and d^3, and the twice-folded sheet is thence delivered to the tapes leading to the vibrating folders.

The cylinders may be provided with duplicate cutters and duplicate folders, so that half-sheets may be cut and folded, as is now well known in the art.

In the case of the narrower-width web (see Fig. 7) it will be divided longitudinally by the slitter H before passing to the turning-bars, which bars will be moved a distance corresponding in proportion to the difference between the width of the narrower web with that of the maximum web, and each half of said narrower web will be led independently to the respective turning-bars 10 20, thence over the rollers C and J to the combined cut-

ting and folding cylinders D, and be thereby severed transversely and folded one or more times and conveyed to the vibrating folders E F and be folded accurately on the center line, as in the case of the sheets from the maximum-width web, and delivered or otherwise manipulated as before.

In lieu of depending upon the adjustable roller J for obtaining the proper register of the web or sheets whether the half-webs be associated or not, one of the half-webs may be led over the adjustable roller J′ (see Fig. 3) before passing to the turning-bar.

The adjustment of the roller J is shown in detail in Fig. 10, wherein the box *f*, carrying the journal of the roller, is mounted to slide in horizontal ways formed in a bracket secured to the side frame. The opposite end of the box is borne upon by an adjustable screw *f′ f²*, by moving which the roller may be adjusted in either direction, as is now well known in the art.

It is not deemed essential to this invention that the web or webs as a web be led over the turning-bar, as it is obvious that the transverse cutting-cylinders may be arranged forward of the turning-bar, in which case sheets would be directed over the turning-bar, as is common. Neither is it deemed essential that the web or sheets be in their flat condition in passing over the turning-bar, as either may have been directed to some longitudinal folder and folded before being directed to the turning-bar. It is also to be observed that the vibrating folders E F are simply herein illustrated with the turning-bar as an example of one type of sheet or web manipulating device, as it is obvious the invention may be employed with other devices which require the proper presentation of the sheet or web thereto.

It is obvious that any means of supporting the turning-bars 10 20 may be adopted that will permit them to be adjusted to different positions, as well as to be adjusted to form a single turning-bar, without departing from the scope of this invention. I have illustrated, however, a novel and convenient means for supporting the turning-bars and holding them in their adjusted positions. For this purpose there is provided a diagonally-arranged supporting-bar 30, extending between the side frames and secured thereto, each turning-bar being supported therefrom by a pair of links 31, pivoted to the supporting-bar and to the turning-bar. The link is formed with a curved slot 32, concentric with the pivot of the link in the supporting-bar, that is engaged by a clamping-nut or other device 33, (see Fig. 9,) by tightening which the turning-bar may be held securely in its adjusted position. In order to accommodate the inward movement of the turning-bar 10 from its normal position, as well as to connect both turning-bars and the supporting-bar with as short links as the necessities of the case will permit, the supporting-bar is bent at or near its central portion, so that one portion may approach and lie contiguous to the turning-bar 20 when in its normal position, and this shape of the supporting-bar will form a space for the adjustment of the turning-bar 10 inwardly toward it, while both the turning-bars will be supported by links of equal length. The ends of the two turning-bars 10 20 are inclined to their axes, so that when the bars are in alinement they will form substantially an unbroken turning-surface.

The turning-bar G, employed for associating two half-width webs, whether the original web be of maximum width or not, may be supported so as to be adjusted to different positions in like manner as one of the bars 10 or 20 is, but, as shown, is provided with slotted ends 34, that are engaged by clamping-bolts 35 to secure the turning-bar in its adjusted position. As shown in full lines in Fig. 4, said turning-bar G is in position to turn the half-width web of the maximum-width web laterally in proper association with the corresponding half-width web turned over the turning-bar 20. When, however, the narrower-width web is employed, the turning-bar 20 is adjusted outwardly, as in Fig. 7, and the associating turning-bar G is adjusted inwardly to the position shown in said Fig. 7 to turn the other half-width web of the narrower web in proper coincidence with the other half turned by the bar 20, in which case the associated webs of the narrower-width web will be presented with accuracy to the subsequent manipulating device, as the vibrating folder F.

While the invention has been described as embodied in a web-printing machine, it is obvious that it may be employed in other machines wherein a turning-bar is employed and wherein it is desirable that the same machine may be capacitated to handle webs of different widths; and, again, while the narrower-width web may be of narrower width in its flat condition, such narrower width may have been imparted by dividing a maximum-width web longitudinally and then longitudinally folding each divided web to form the web of "narrower width" within the meaning of that term herein.

What is claimed is—

1. The combination of the transverse supporting-bar having at its forward side one of its portions in advance of the other portion, two independent turning-bars with their abutting ends inclined, and a pair of parallel links for each bar and pivoted to the bars, whereby each bar may be independently adjusted and moved in parallel planes one forward and the other backward with respect to their normal axial alinement, as set forth.

2. The combination of the transverse supporting-bar having at its forward side one of its portions in advance of the other portion, two independent turning-bars with their abutting ends inclined, a pair of parallel links

for each bar, and pivoted to the bars, whereby each bar may be independently adjusted and moved in parallel planes one forward and the other backward with respect to their normal axial alinement, and two vibrating folders cooperating with said turning-bars to centrally fold sheets of different widths without adjustment of the folders, as set forth.

In witness whereof I have signed my name, in the presence of two witnesses, this 23d day of July, A. D. 1891.

GEO. B. TITSWORTH.

Witnesses:
THEODORE F. FRENCH,
H. MCDONALD.