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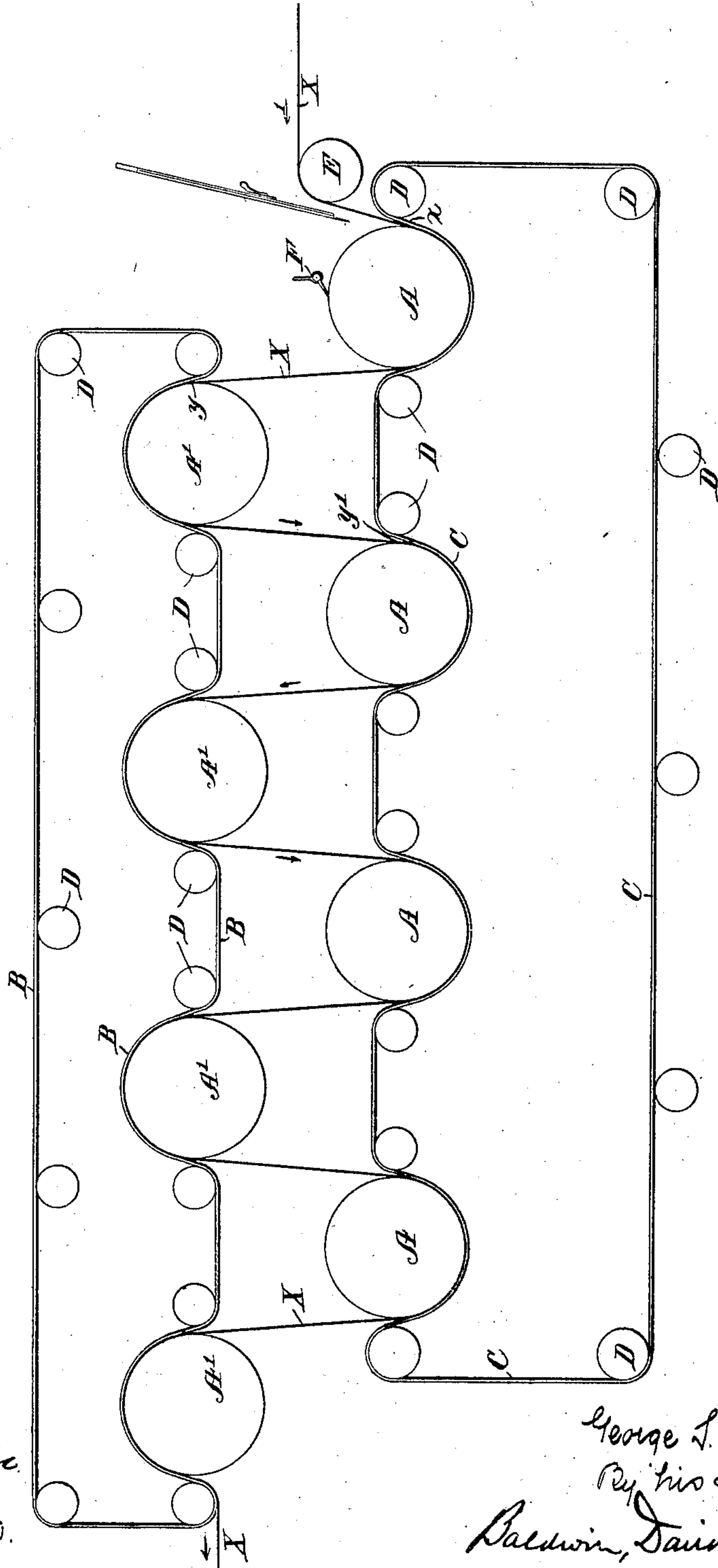
Patented July 15, 1902.

G. S. WITHAM.  
PAPER MAKING MACHINE.  
(Application filed Feb. 27, 1902.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



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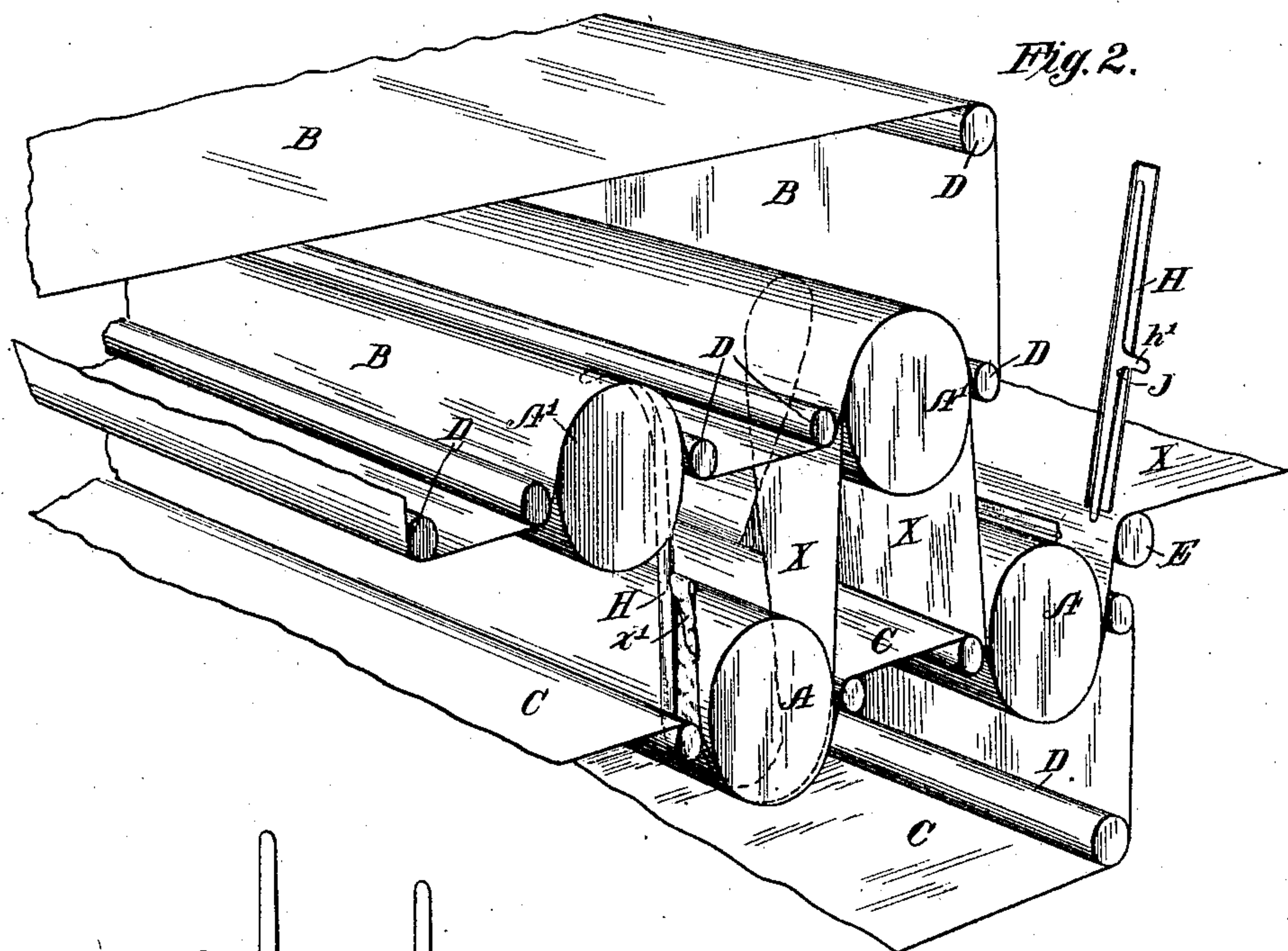
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(No Model.)

**3 Sheets—Sheet 2.**



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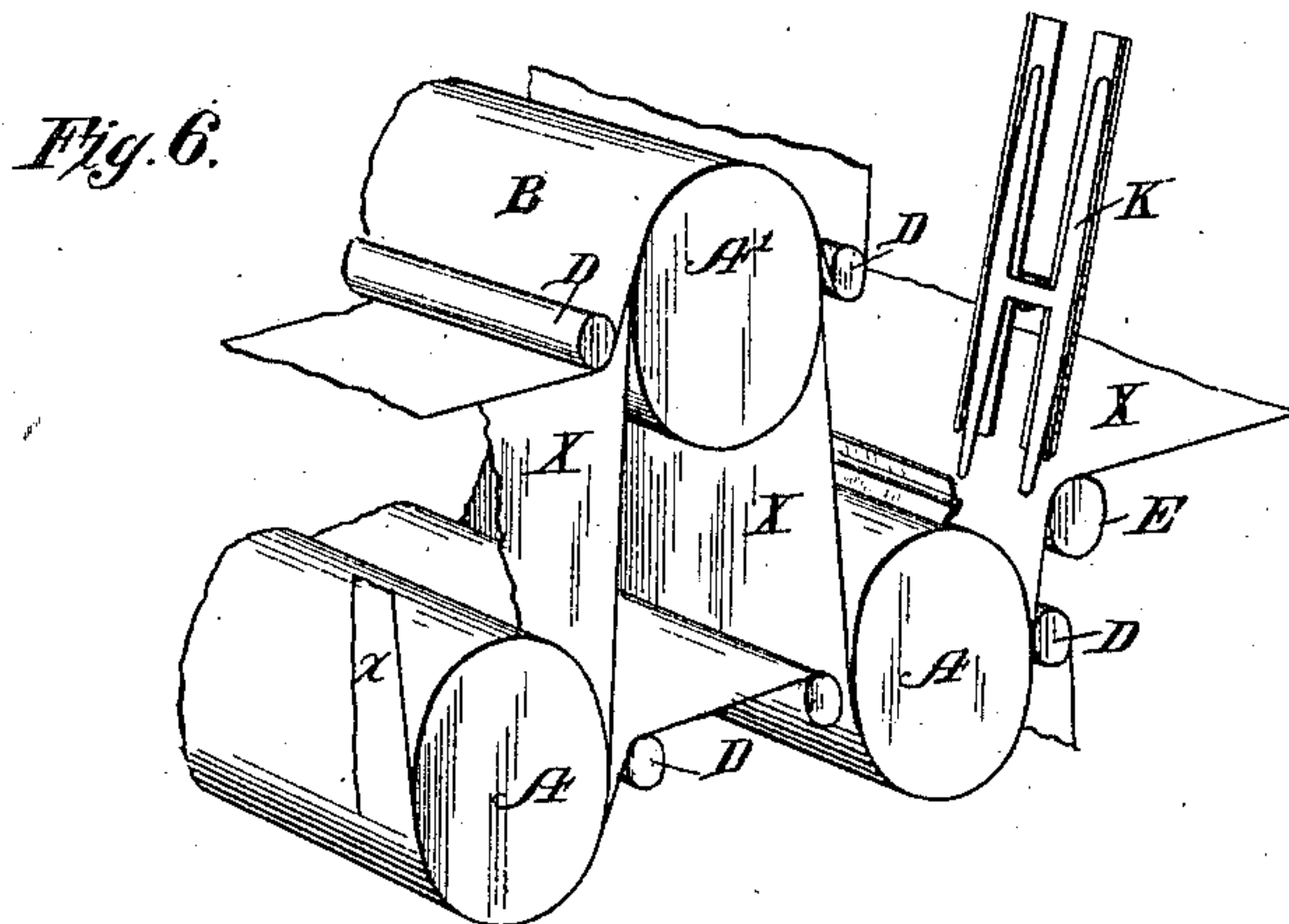
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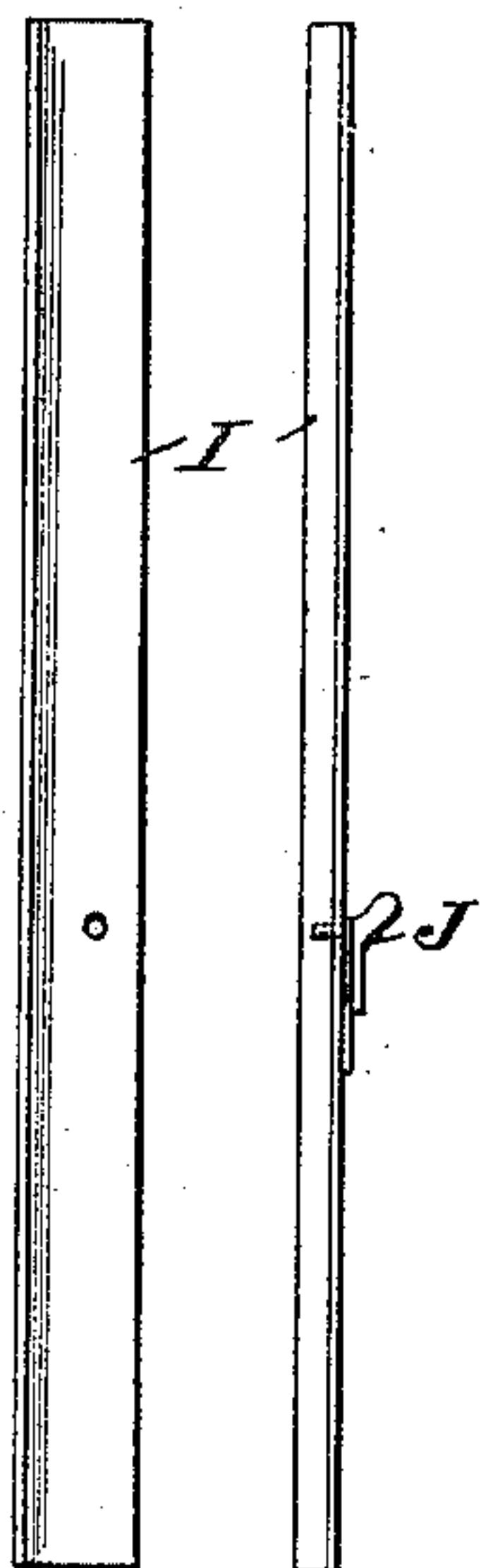
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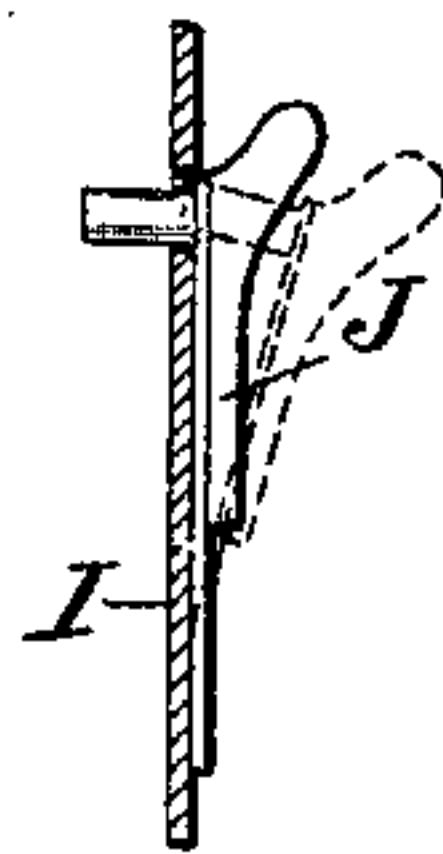
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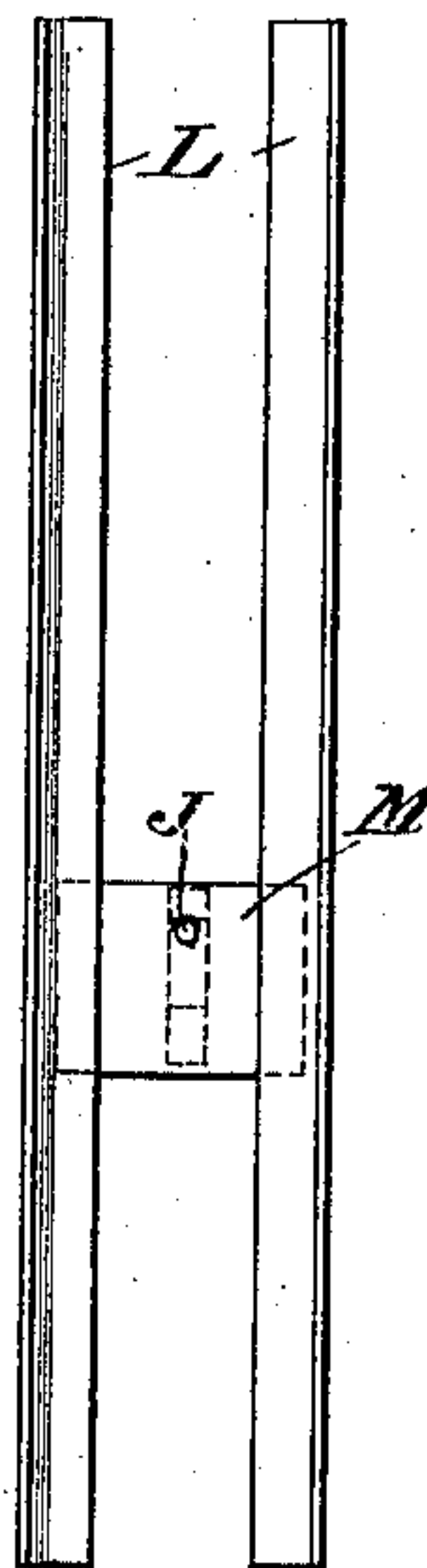
*Fig. 7.*      *Fig. 8.*



*Fig. 11.*



*Fig. 9.*



*Fig. 10.*

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# UNITED STATES PATENT OFFICE.

GEORGE S. WITHAM, OF MILLINOCKET, MAINE.

## PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 704,607, dated July 15, 1902.

Application filed February 27, 1902. Serial No. 95,988. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE S. WITHAM, a citizen of the United States, residing at Millinocket, in the county of Penobscot and State of Maine, have invented certain new and useful Improvements in Paper-Making Machines, of which the following is a specification.

My invention relates to paper-making machines in which the sheet or web of paper after having been pressed and before passing through the calenders is led through driers consisting of heated cylinders or drums and endless felts, which latter press the paper against the cylinders and also cause it to move from one driving-cylinder to the other throughout the series.

The object of my invention is to provide efficient means for starting a web of paper through the driers after it has been broken or torn. Ordinarily whenever the paper is broken or torn it is led through the driers by hand, the attendant feeding the front end of the web separately into the bight of the cylinders and felts throughout the series. I have provided a device which automatically leads the paper through the series of drying-cylinders whenever a break occurs or when starting up the machine.

My invention is especially adapted for use in that class of driers known as "double-deck" driers, in which two series of horizontal cylinders or drums, one above the other, are used in connection with two endless belts, one moving in contact with the upper surface of the upper series of cylinders, while the other moves in contact with the under surface of the lower series. In the accompanying drawings I have shown my improvements applied to driers of this class.

Figure 1 is a diagram showing a side elevation of paper-drying apparatus with my improvements applied. Fig. 2 is also a diagram in perspective showing the manner in which the pilot which I employ for leading the paper through the drying apparatus is used. Fig. 3 is a perspective view of one form of pilot. This figure also illustrates how the end of the paper is attached to the pilot. Fig. 4 shows another form of pilot and indicates the manner of attaching the end of the paper to it. Fig. 5 is a perspective view

of the pilot shown in Fig. 4, and this figure also shows the manner of attaching the paper. Fig. 6 is a diagram in perspective showing the manner of using the form of pilot illustrated in Fig. 3. Fig. 7 shows an elevation of the guide for the pilot shown in Figs. 2, 4, and 5. Fig. 8 is a view of the same at right angles to the view shown in Fig. 7. Fig. 9 shows an elevation of a guide for the pilot shown in Figs. 3 and 6. Fig. 10 shows an end elevation of the pilot-guide shown in Fig. 9. Fig. 11 is a detail view illustrating the catch for holding the pilot in the guide.

The drums (shown in Figs. 1, 2, and 6) may be of ordinary construction, the cylinders or drums A A' being arranged in two series, one above the other, in different vertical planes, and the upper felt B and lower felt C are constructed and arranged in the usual way, being guided, as usual, by rollers D.

E indicates a roller, which may or may not be heated, for guiding the paper X into the bight of the first lower drying-cylinder, and F indicates a doctor, which is commonly employed in drying apparatus of this class.

The paper moves in the direction of the arrow 1 from the press-rollers over the guide-roller E into the bight of the first lower drying-cylinder and the lower felt, as indicated at  $x$  in Fig. 1. After passing around the lower surface of the first lower drying-cylinder it passes to the upper surface of the first upper drying-cylinder A' and then passes throughout the series of cylinders, as indicated by the arrows and in the usual manner. As long as the web of paper is continuous and unbroken it passes throughout the entire machine without interruption from the fourdrinier to the winding-rolls; but when the paper is broken or torn the operation of the machine is interrupted. Ordinarily this is remedied in the following manner: The attendant at the fourdrinier cuts the web of paper diagonally, as indicated in Fig. 4, producing a narrow end  $x'$ , which may be readily handled by an attendant, who threads this end through the different parts of the apparatus, the part cut off from the web X running to waste. It is not necessary to describe how this narrow end is threaded through the press-rollers or other parts of the



apparatus, as my invention relates to the drying mechanism. In order to thread the paper through the driers, the attendant takes hold of the front end  $x'$  of the web, feeds it into the bight of the first drying-cylinder at  $x$ , and when it has passed under the first drying-cylinder he takes hold of it again as it rises and feeds it into the bight of the first upper drying-cylinder, and in like manner feeds it into the bight of the several cylinders throughout the series. This is the ordinary practice; but it requires time and is a dangerous operation, as the hands of the attendant are apt to be drawn in between the felts and the cylinders, which latter are highly heated. Webs of paper are now made of great width, sometimes being between one hundred and twenty-five and one hundred and fifty inches in width, and it is of course impossible for one attendant to handle the wide web and thread it. For this reason the paper has been cut diagonally in the manner before described, and it has been found that when so cut the web may be threaded by an attendant through the driers.

According to my invention I employ a device to take the place of the attendant for threading the drier. This device may be made in various ways. I have shown two forms of the invention which are found to be the best. I call the device a "pilot," as it serves to lead and direct the paper from one end of the series of drying-cylinders to the other without any handling or other attention from the attendant. In Figs. 4 and 5 the pilot is shown as consisting of a long piece of metal  $H$ , preferably of spring-steel, with curved or rounded ends  $h$  and a laterally-projecting arm  $h'$ , located, preferably, about midway between its ends. The pilot is made from thin sheet metal. Its widest part is preferably midway between its ends, and it gradually tapers toward the opposite ends. The edges are smooth and the outer end of the arm  $h'$  is made curved or smooth, as indicated in Fig. 5. The pilot should be of sufficient length to reach from the bight of the lower felt and one of the lower cylinders to the bight of the upper felt and the next upper cylinder, as indicated in Fig. 2. Usually this is about three feet. The arm  $h'$  is preferably about ten inches long; but this is not important. It should be long enough to take a good hold on the narrow end of the paper in the manner indicated in Figs. 2, 4, and 5. When the web of paper is broken, a narrow cut is made in the web, as before described, and when this narrow end reaches the roller  $E$  it is guided down into the bight of the lower felt in the first lower cylinder and passes around the under surface of the first lower cylinder. Its tendency would be to pile up against the doctor  $F$ . Heretofore, as before described, the attendant picks it up at this point and feeds it into the bight of the first upper cylinder; but according to my invention the pilot is dropped into the bight of

the lower felt and the first lower cylinder at the proper time, so that its arm  $h'$  will pick up the front end of the web and the attendant may simply turn the end of the paper over the arm in the manner indicated in Figs. 2 and 5, so that the web of paper becomes attached to the pilot, which will then carry it throughout the series of driers. The pilot, being made of thin spring metal, will bend while passing around the lower cylinder, and, being elastic, as soon as its front end rises from the lower surface of the first lower cylinder it will straighten out and point toward the bight of the upper felt and the first upper cylinder—that is, toward the point marked  $y$  in Fig. 1. Its further movement will cause it to enter between the upper felt and the first upper cylinder, and it will then pass around the upper surface of this cylinder, bending in the proper manner to conform to the surface of the cylinder and then straightening out and point to the place marked  $y$ , then passing into the bight of the lower felt and the second lower cylinder. In like manner the pilot passes from one cylinder to the other throughout the series, carrying the paper with it as it goes, and thus finally threading the narrow end of the paper through the driers, the web of uniform length in this manner being finally completely threaded, and the machine may then be operated continuously in the ordinary way. Of course the speed of the pilot is the same as that of the paper, so that there is no undue tension on the paper, which would tend to break it. After having traversed the entire series of driers the pilot will fall to the floor, where it may be separated from the paper. I have found it convenient to hold the pilot in a guide, so that it may be accurately fed to the driers when its services are required. Such a guide is shown in Figs. 1, 2, 7, and 8. It consists of a piece of angle-iron  $I$  of about the length of the pilot, provided with a spring-catch  $J$ , attached to it near its middle portion and which is adapted to engage with the arm  $h'$  of the pilot. The guide may be attached to any part of the machine, being arranged at the proper angle to guide the pilot into the bight of the lower felt and the first lower drying-cylinder in the manner indicated in Fig. 1. By simply tripping the catch the guide may be allowed to fall into the bight of the felt and drier, it only being necessary to trip the catch at the proper time, so that the arm  $h'$  will be in proper relation to the web when the latter is in position to be attached to the pilot.

In Fig. 3 I have shown a modified form of pilot. In this instance two long sheet-metal plates or bars  $K$  are employed, connected by a cross-piece  $k$ , making the pilot substantially H-shaped. The arm  $h'$  in Fig. 5 may be formed integrally with the main portion  $h$  of the pilot, or it may be separately secured thereto, care being taken to avoid projections of any kind, so that the pilot may be per-



fectly smooth. In like manner the cross-piece *k* may be formed integrally with the side pieces *K* or it may be secured thereto either by brazing, soldering, or riveting, care being taken to avoid projections, which would be apt to tear the paper or to injure the driers and felts.

When an H-shaped pilot is used, the guide is somewhat modified. A guide suitable for such a pilot is shown in Figs. 6 and 9. It consists of two angle-irons *L*, connected by a cross-plate *M*, provided with a spring-catch *J*, similar to that shown in Fig. 8. This guide is arranged in the same manner as the guide *I*, and the operation of moving the pilot over the guide is the same.

The form of the pilot may of course be modified in various ways, but its construction should be such that it can bend when passing around the cylinders, and it should be of such length as to reach from one cylinder to the other, sufficient elasticity being provided to cause the pilot to straighten out after bending, and it should have a device of some kind, such as the arm *h'* of the cross-piece *k*, to which the narrow end of the paper may be attached.

I claim as my invention—

1. A pilot for leading a web of paper through driers, consisting of a spring-metal plate adapted to reach from one drying-cylinder to another and having a device for engaging the end of the paper.

2. A pilot for leading a web of paper through driers, consisting of a spring-metal plate adapted to reach from one drying-cylinder to another, and having a lateral projection for engaging the end of the paper.

3. A pilot for leading a web of paper through driers consisting of a thin elastic plate or bar having smooth or rounded ends and a laterally-projecting arm between its ends for engaging the end of the paper.

4. A pilot for leading the web of paper through driers, consisting of two spring-metal plates adapted to reach from one drying-cylinder to another and having a cross-piece for engaging the end of the paper.

5. The combination with the upper and lower series of drying-cylinders and their felts, of a pilot for threading a web of paper therethrough, consisting of a thin spring-metal plate adapted to reach from one drying-cylinder to another, and having a device for engaging the end of the paper.

6. The combination with the upper and lower cylinders and their felts, of a pilot for leading a web of paper therethrough, consisting of a thin sheet-metal plate adapted to reach from one drying-cylinder to another and having a laterally-projecting arm for engaging the end of the paper.

7. The combination of the drying-cylinders and felts, of a pilot for the paper consisting of a spring-metal plate adapted to reach from one drying-cylinder to another and having a device for engaging the end of the paper, and a guide for supporting the pilot and directing it into engagement with the first drying-cylinder and its felt.

In testimony whereof I have hereunto subscribed my name.

GEORGE S. WITHAM.

Witnesses:

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CLINTON STEVENS.