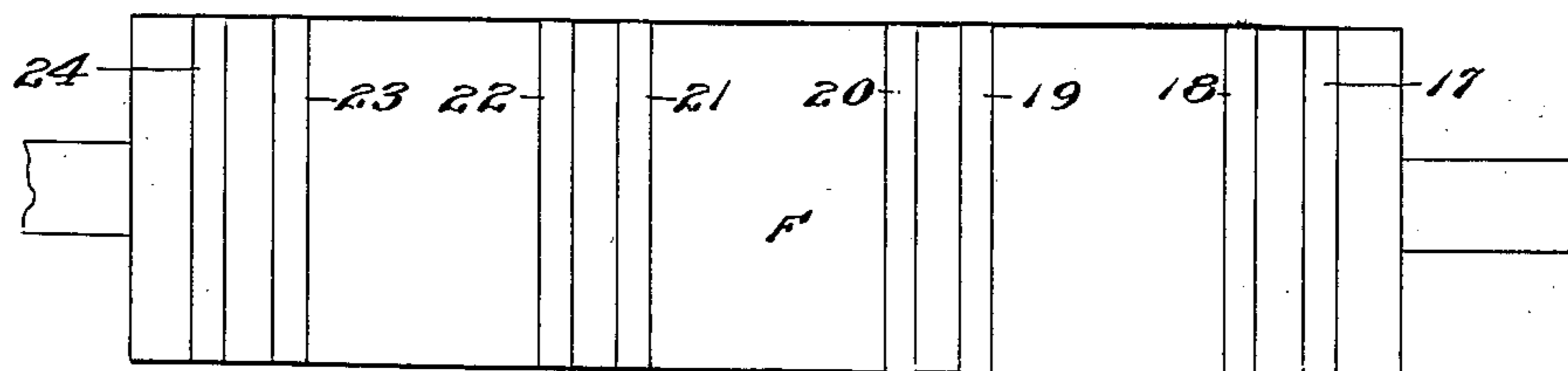
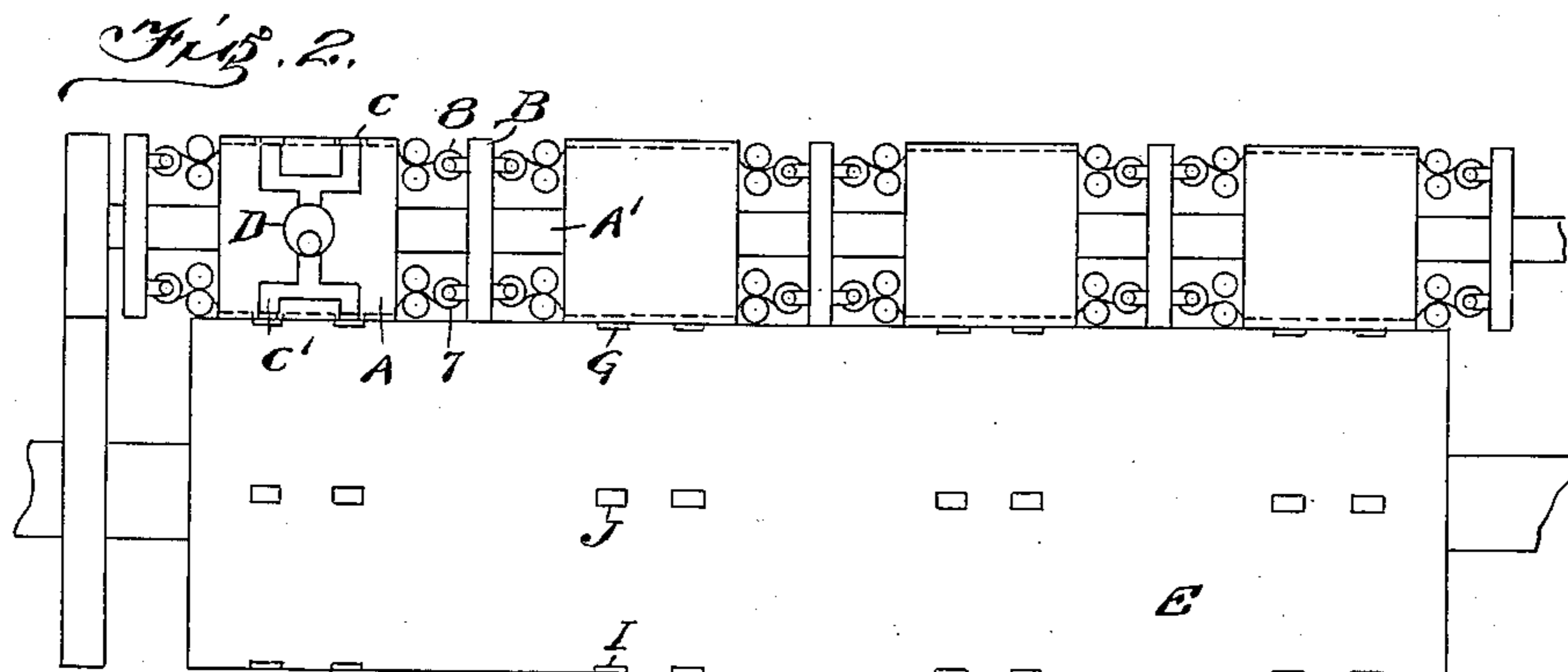
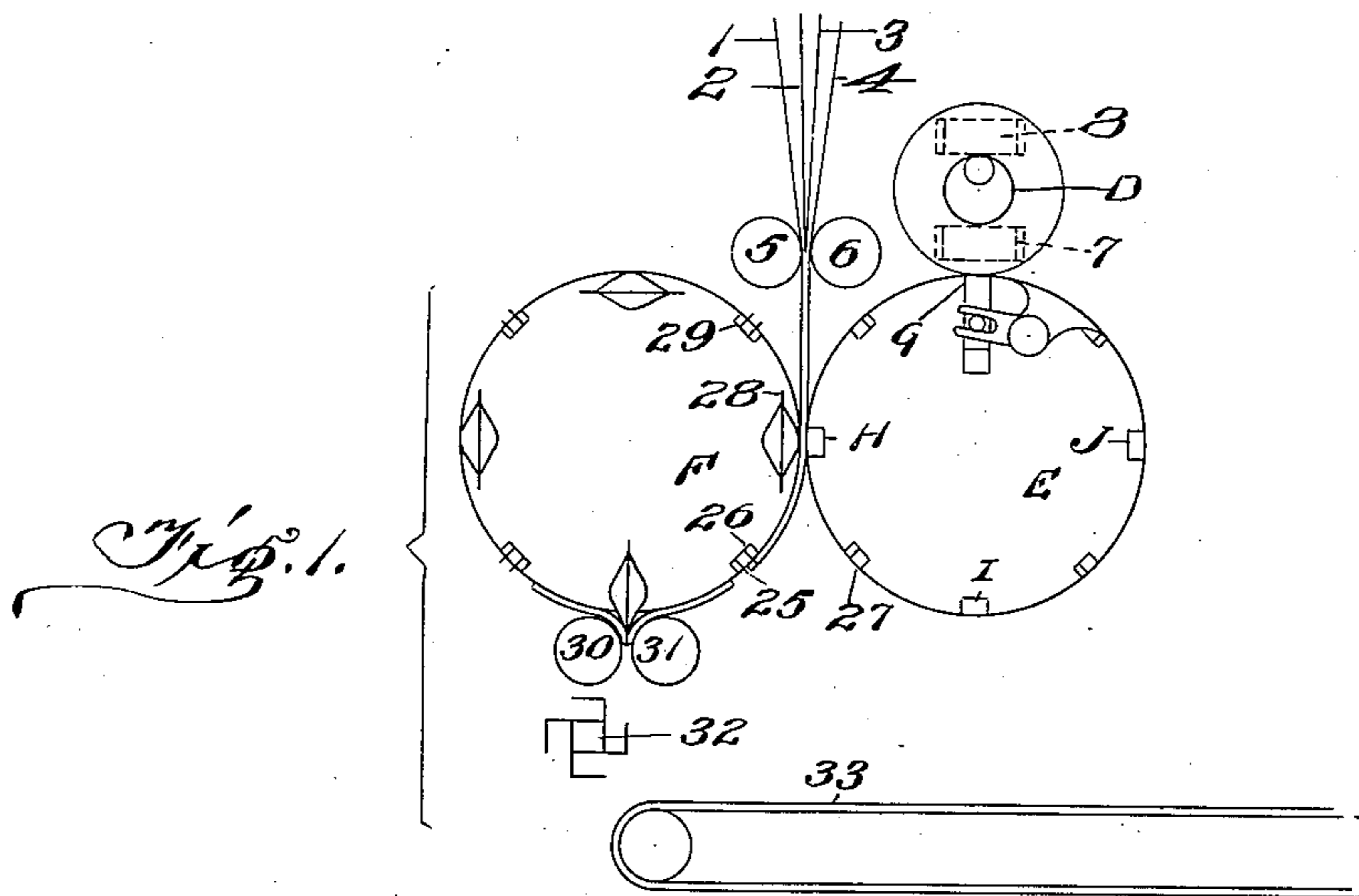


J. L. FIRM.  
STAPLING MACHINE.  
APPLICATION FILED MAR. 13, 1909.

945,506.

Patented Jan. 4, 1910.  
3 SHEETS—SHEET 1.



Witnesses  
*Harold Megrew.*

Inventor  
*Joseph L. Firm.*

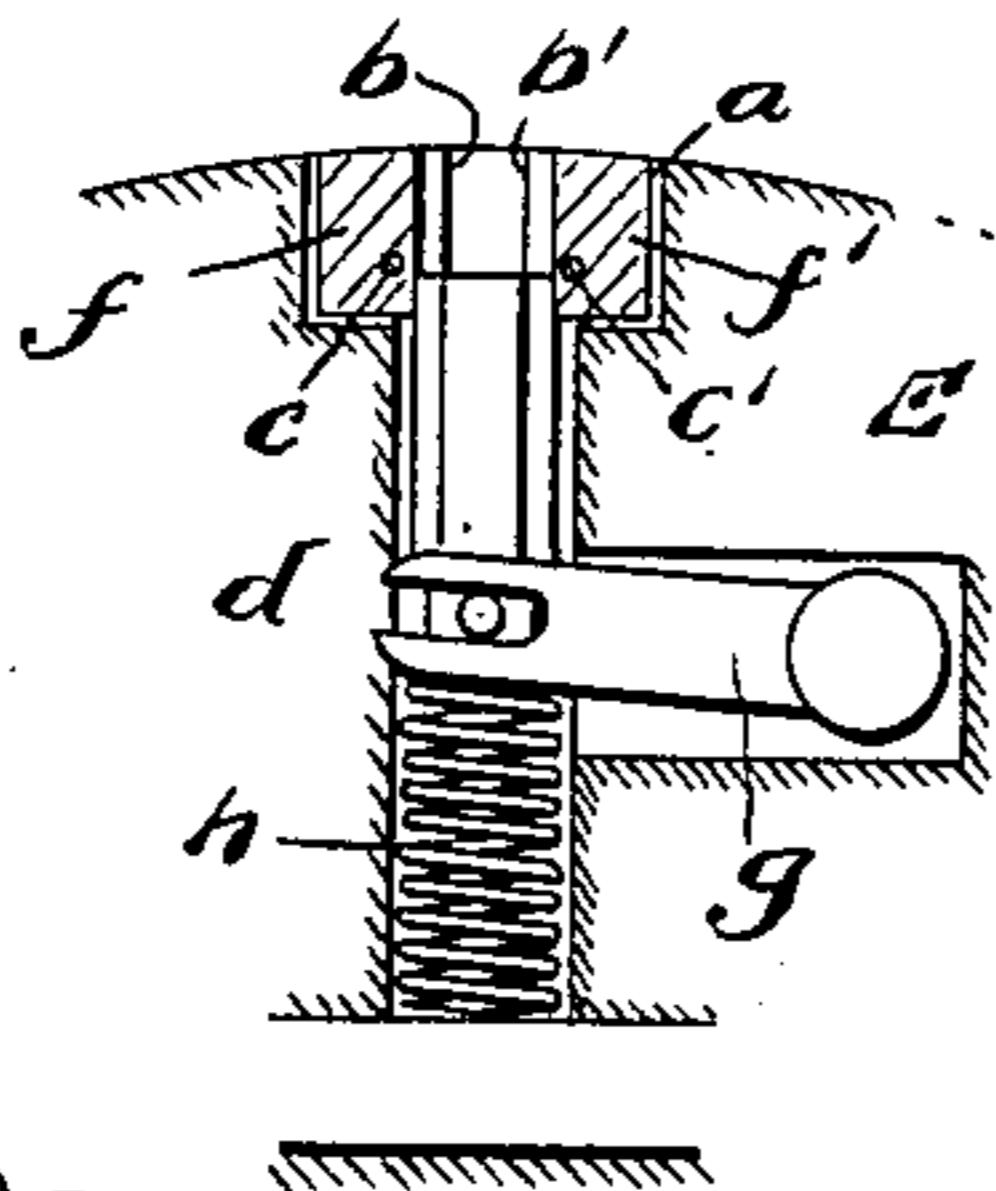
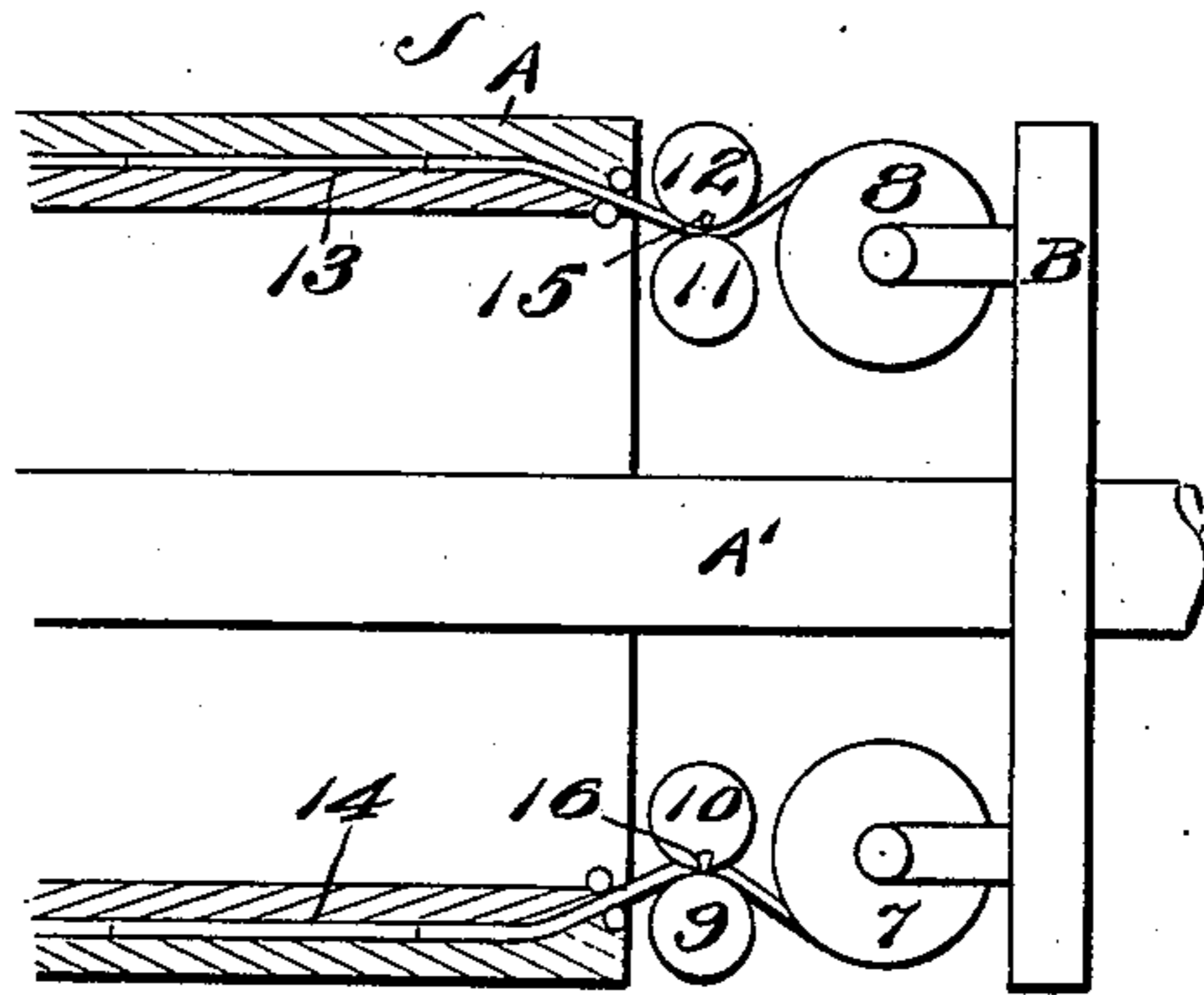
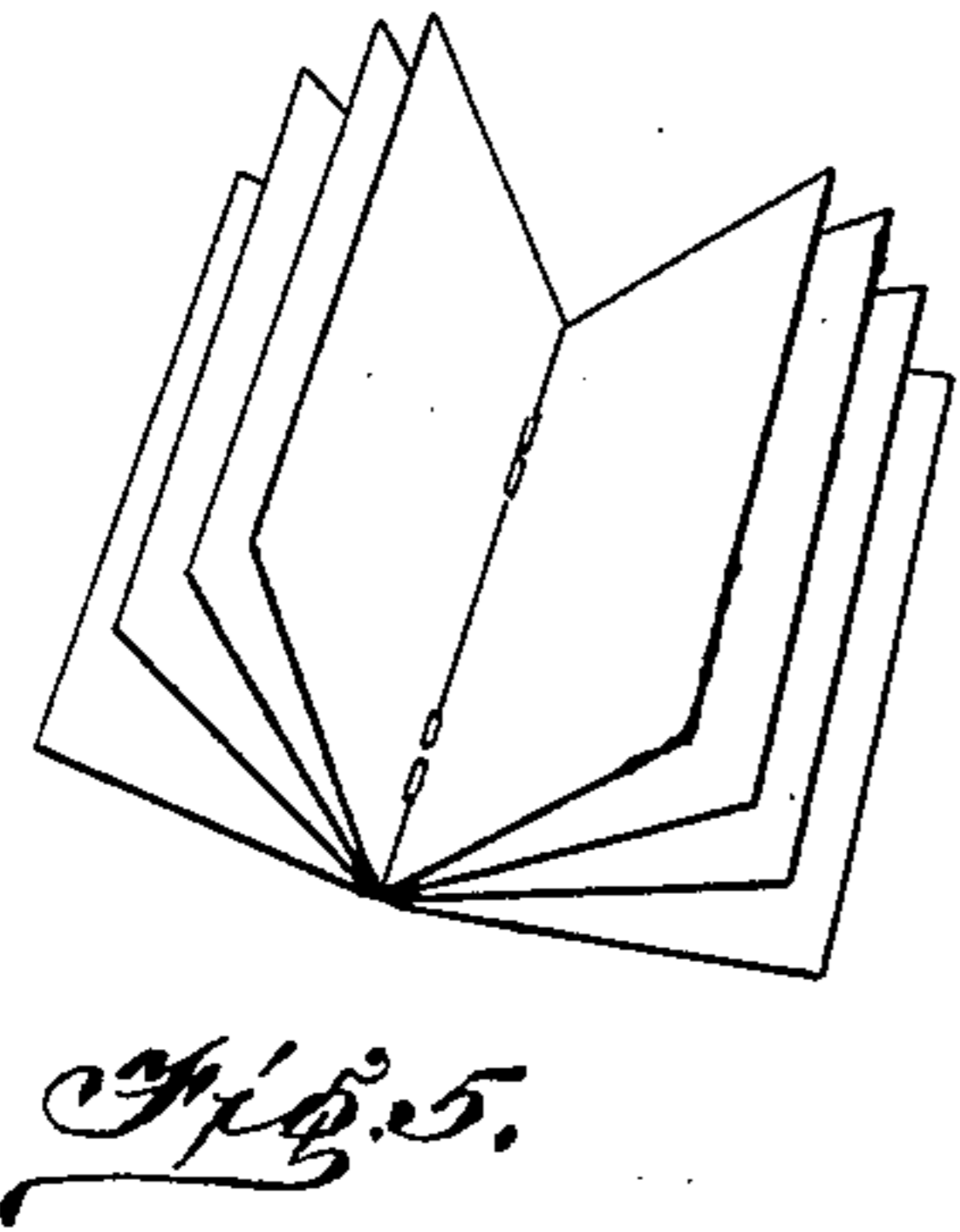
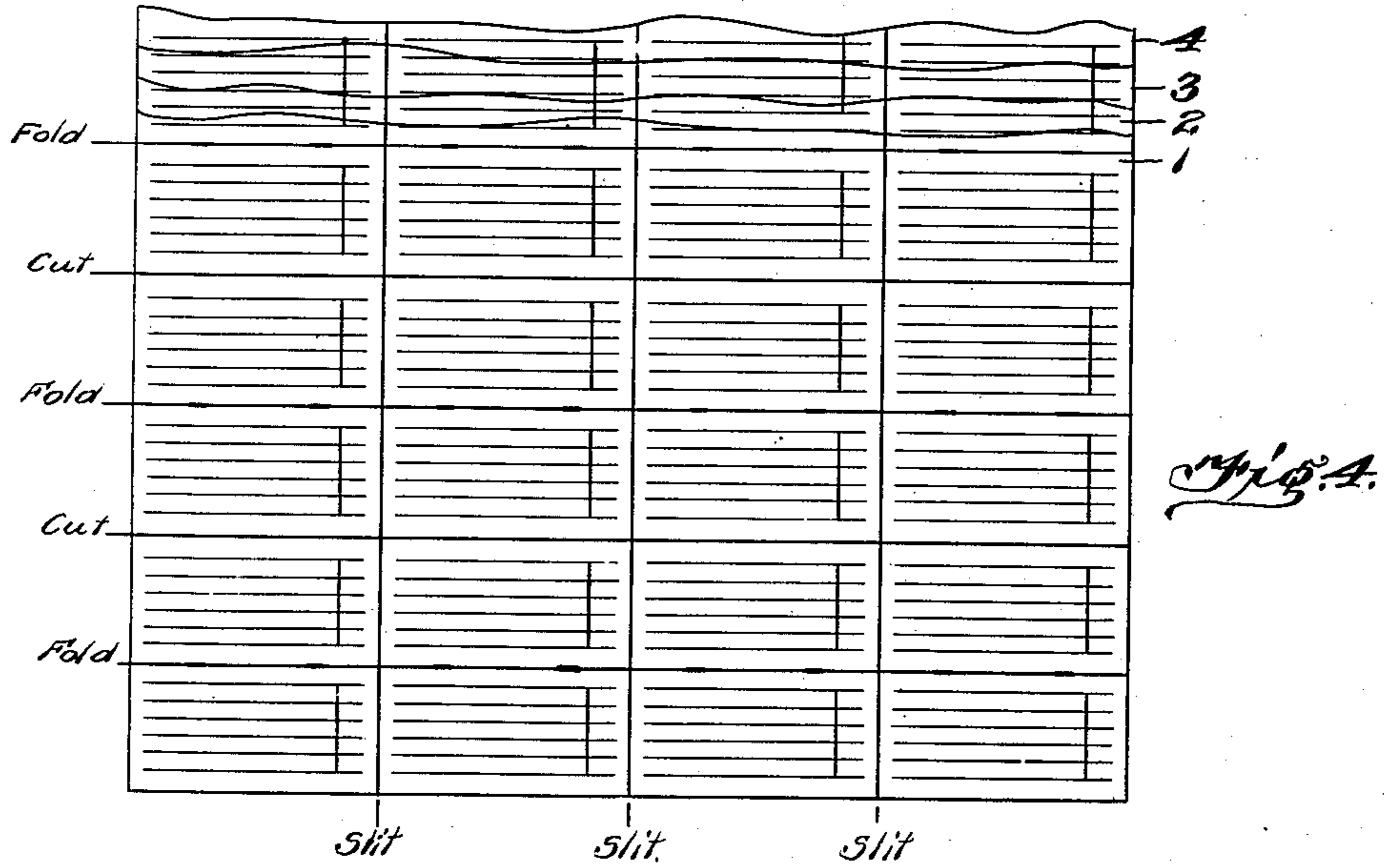
By *E. E. Jew*  
Attorney

J. L. FIRM.  
STAPLING MACHINE.  
APPLICATION FILED MAR. 13, 1909.

945,506.

Patented Jan. 4, 1910.

3 SHEETS—SHEET 2.



Witnesses  
*John*  
*Harold Megrew*

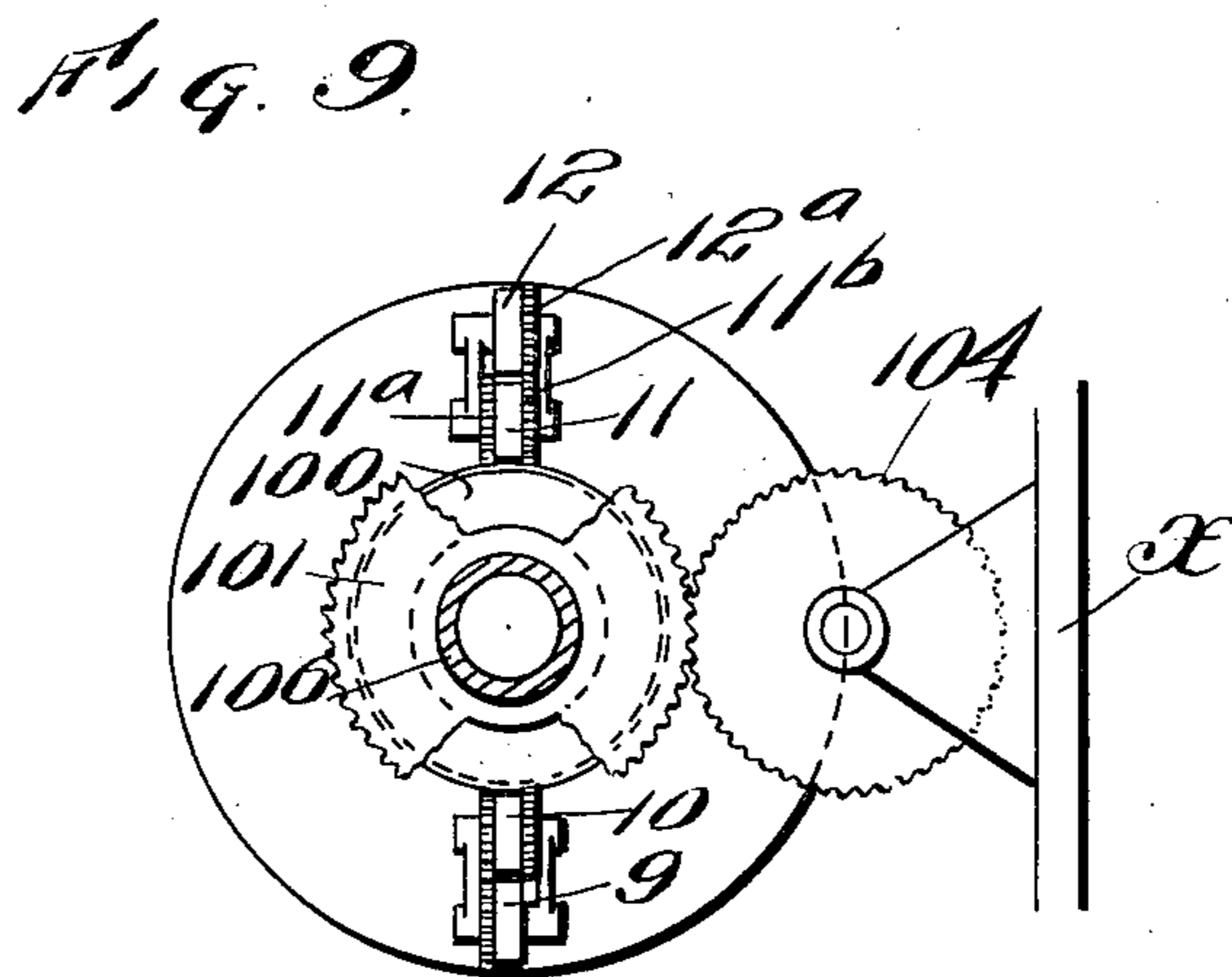
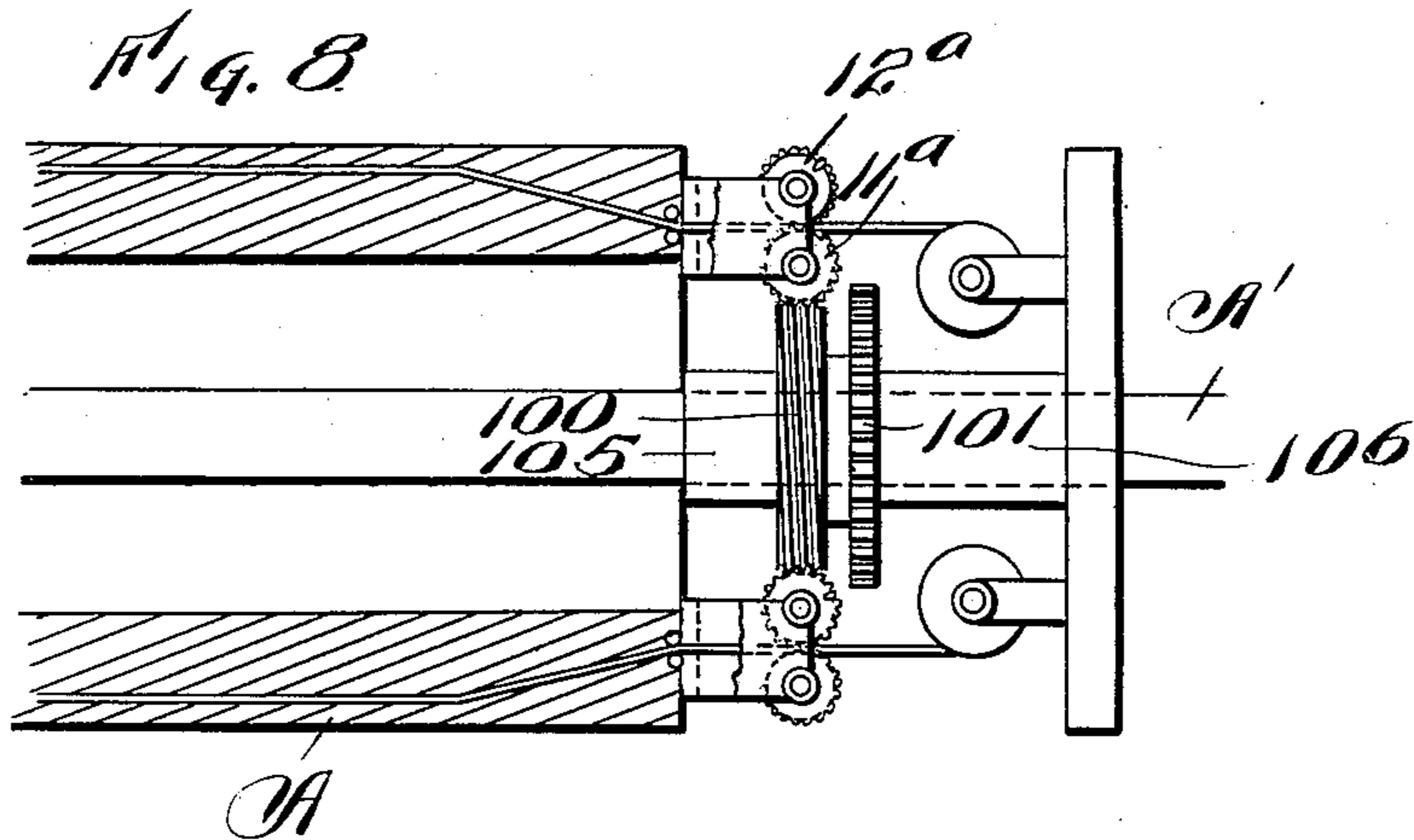
Inventor  
*Joseph L. Firm.*

By *W. E. Jew*  
Attorney

J. L. FIRM.  
STAPLING MACHINE.  
APPLICATION FILED MAR. 13, 1909.

945,506.

Patented Jan. 4, 1910.  
3 SHEETS—SHEET 3.



WITNESSES  
*Geo. L. Thom*  
*Novell Smith*

INVENTOR  
*Joseph L. Firm.*  
*by Geo. E. Tew*  
Attorney

# UNITED STATES PATENT OFFICE.

JOSEPH L. FIRM, OF BERWYN, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, OF CHICAGO, ILLINOIS.

## STAPLING-MACHINE.

945,506.

Specification of Letters Patent.

Patented Jan. 4, 1910.

Application filed March 13, 1909. Serial No. 483,237.

*To all whom it may concern:*

Be it known that I, JOSEPH L. FIRM, citizen of the United States, residing at Berwyn, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stapling-Machines, of which the following is a specification.

This invention is a stapling mechanism for binding pamphlets from a rotary printing machine, and has for its object to provide an improved mechanism for slitting, cutting, folding and stapling a plurality of pamphlets or the like at a single operation.

In the Crowell patents of December 12, 1893 machines are shown and described for stapling associated webs on a continuously moving roll or carrier, but such mechanisms only staple one pamphlet or signature at a time, and hence the capacity is limited. The present invention provides means for stapling a plurality of pamphlets at a time. The plurality of longitudinal associated webs are stapled on a transverse line after having been longitudinally slit and are then transversely cut, and are then folded in intermediate transverse lines, and delivered as single signatures or pamphlets. The disadvantages incident to the use of paste or glue for uniting the different pages are avoided, and as the stapling devices always move in the same direction as the run of the webs a high speed can be obtained. As the products are all stapled or bound together before being transversely cut and folded, no tapes or guides are needed to insure the travel of the products to the delivery. Instead of a device for making a single staple, I provide a double staple mechanism whereby two staples are made and inserted at a single operation, thereby completing a book or pamphlet at each stroke.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic end view of the cutting, folding and stapling rolls and devices. Fig. 2 is a diagrammatic side elevation of the staple forming cylinders and the associated carrier. Fig. 3 is a diagrammatic plan of the carrier roll with the ribs for clenching the staples. Fig. 4 is a plan of the associated webs, showing the slitting, cutting and folding lines. Fig. 5 is a view of a sixteen page product. Figs. 6 and 7 are details of one of the stapling mechanisms. Figs. 8 and 9 are side and end views

showing means for driving the wire-cutting and feeding rolls.

The webs 1, 2, 3 and 4 having been printed and slit longitudinally into a series of narrow webs, as shown in Fig. 4, pass between the rollers 5 and 6 (Fig. 1) and then between the staple-holding rotary carrier E and the rotary folding carrier F, and the staples are driven through the webs and clenched against the circular bands 17, 18, 19, 20, 21, 22, 23, and 24 on the carrier F, shown in Fig. 3. The webs are cut and pinned at their leading ends, as shown, by the knife 25 and pins 26 on carrier F co-operating with the matrix 27 on cylinder E, and pass around until they are cut transversely by the knife 28, and the incoming webs are pinned on the pins 29, to be acted on again in the same manner. There are four sets of cutting and folding devices on cylinders E and F, said devices being of any ordinary and well known construction. The webs having been cut transversely are stapled on the middle or folding line and are folded off between the rollers 30, 31, and delivered by the rotary fly 32 to the apron 33.

As shown in Fig. 2 there are four sets of double wire staple forming devices arranged on or along the cylinder A. Each set has oppositely acting double-armed staple formers C and C' which are reciprocated by a cam D. The mechanism is in its details the same as known staple formers, except that the double formers make two staples at each stroke. Between the cylinders A having the pairs of staple forming devices, and at the ends, the shaft A' has a head B to hold the spools of wire 7 and 8 (see Fig. 6), and 9, 10, 11 and 12 are the feeding and cutting rolls mounted in well known manner on the ends of the cylinders A, for feeding and cutting the wires in proper lengths by the knives 15 and 16 on the rollers 10 and 12; and the cut wires pass through the grooves 13 and 14 in the face of the cylinder A to the respective arms of the double or U-shaped formers C, C' by which they are formed and delivered in a known manner to the staple holding and driving devices on the carrier E.

For driving the rolls 9, 10, 11 and 12 any suitable form of mechanism may be employed. A conventional form is shown in Figs. 8 and 9 wherein 100 is a worm with a spur gear 101 attached thereto and running

loose on shaft A'. The spur gear 101 is driven by another spur gear 104 supported on the frame X of the machine and driven by any suitable means. The worm 100 and gear 101 are held in place by collars 105 and 106. The worm 100 meshes with a worm gear 11<sup>a</sup> on the roll 11, which has also a spur gear 11<sup>b</sup> meshing with a gear 12<sup>a</sup> on roll 12 whereby both rolls are driven. Various other mechanisms for the same purpose might be used.

The formers C and C' are reciprocated by a cam D, to deliver the staples to the sets of staple holding devices indicated as a whole at G, H, I and J on the cylinder E, there being four rows of such devices to correspond to the four holders and products delivered at each revolution for each row, making sixteen complete pamphlets at each revolution. Each of said devices may consist, as shown in Fig. 7 of a box *a* set in the cylinder E, with sides *f*, *f'* hinged at *c*, *c'* and having grooves *b* *b'* to receive the staple.

*d* is the driving head which works radially and drives the staple through the pamphlet, said staple having been held in place by the hinged sides *f* and *f'*. The driving head is driven by a quick cam *g*, with springs *h* to help return it.

As shown in Fig. 4, the webs come out of the printing machine in a straight line, superposed or plicated, and with the column rules parallel to the axes of the carrier cylinders, which enables the staples to be inserted on the transverse folding line at the middle of each cut product. The four rows of four sets of stapling mechanisms parallel with each other produce as stated sixteen books or pamphlets, this result being permitted by the wire-holding heads B between the cylinders A and the double stapling devices. The increase of capacity is obvious as compared to known devices which insert a single staple at a time.

I claim:

1. The combination of a pair of rotary folding and cutting carriers, one of which is provided with a row of staple holding and setting devices, said row consisting of a plurality of said devices, and a cylinder located outside of and rotating adjacent to said carrier and in unison therewith, and provided with means to form staples and deliver the same to said devices.

2. The combination of a rotary cylinder

having a pair of staple holding and setting devices, and a rotary cylinder located exterior and adjacent to said cylinder, and having a corresponding pair of staple forming devices arranged to deliver staples to the holding devices, and wire feeding and cutting devices at opposite ends of the cylinder having the staple forming devices and adapted respectively to feed wire to each of said devices.

3. The combination of a rotary carrier having a longitudinal row of pairs of staple holding and setting devices, and a series of rotary cylinders respectively opposite said pairs, each of the cylinders having staple forming devices coöperating with said holding and setting devices, and wire feeding and cutting devices at the opposite ends of each cylinder.

4. The combination of a rotary carrier having a pair of staple holding and setting devices, and a rotary cylinder having a double staple-forming device with two connected staple-forming arms, adapted to form and deliver two staples to said holding devices at each operation.

5. The combination of a rotary carrier having a longitudinal row of staple-holding and setting devices, a shaft, spaced heads mounted thereon, wire-supplying devices carried by said heads, and staple forming mechanism to which the wire is fed, mounted on said shaft between the heads, and coöperating with the holding and setting devices to deliver staples thereto.

6. A staple former comprising a rotary shaft having a head thereon, cylinders on the shaft at opposite sides of the head, staple forming devices carried by the cylinders, and wire supplying devices mounted on opposite sides of the head and arranged to feed wire to the respective cylinders.

7. A staple former comprising a cylinder, a double staple forming device carried by the cylinder, and having a pair of arms at each side of the cylinder, said arms being connected together, and double wire feeding devices carried at each end of the cylinder.

In testimony whereof, I affix my signature in presence of two witnesses.

JOSEPH L. FIRM.

Witnesses:

MATILDA GEDERT,

AMELIA B. FIRM.