

No. 631,716.

Patented Aug. 22, 1899.

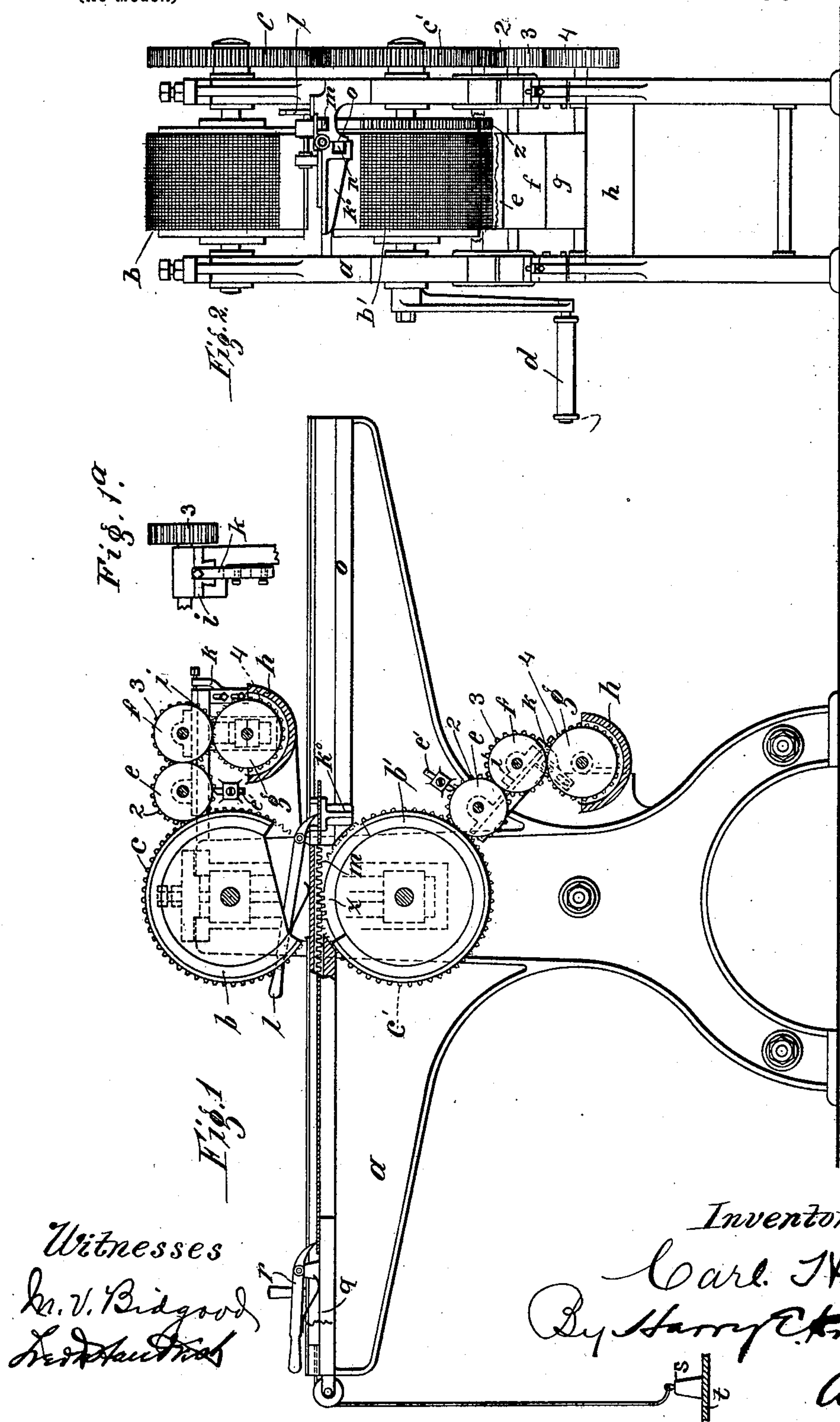
C. HORN.

MACHINE FOR PRINTING STOCKINGS, &c.

(Application filed Apr. 7, 1897.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses  
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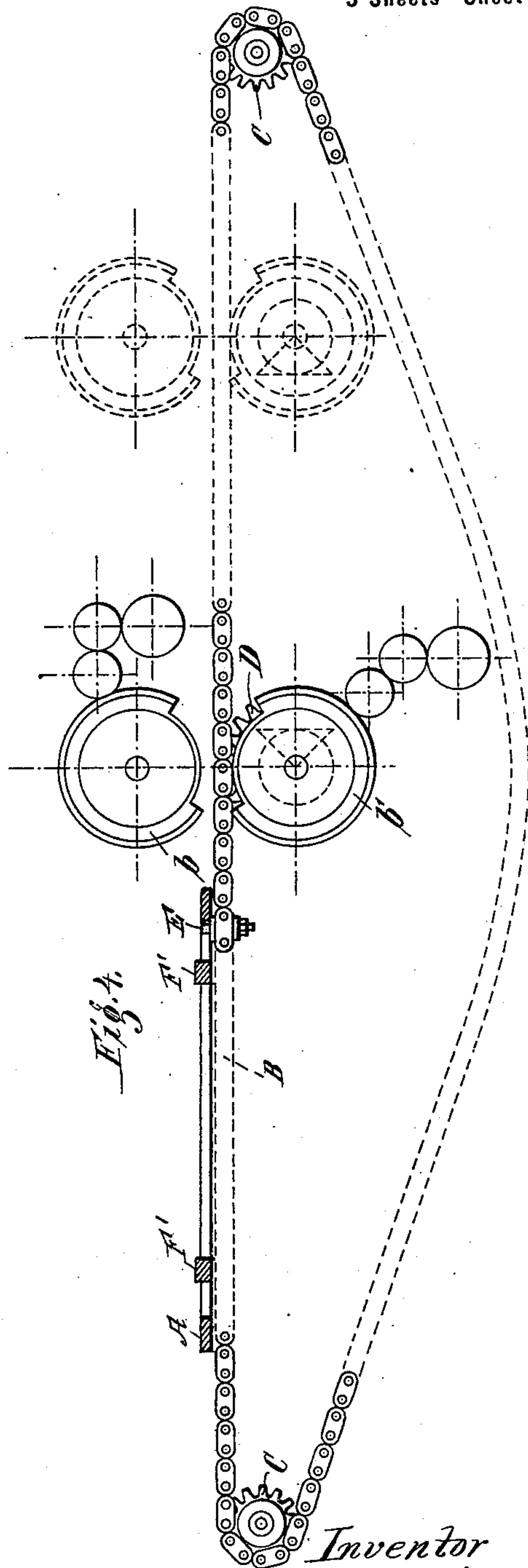
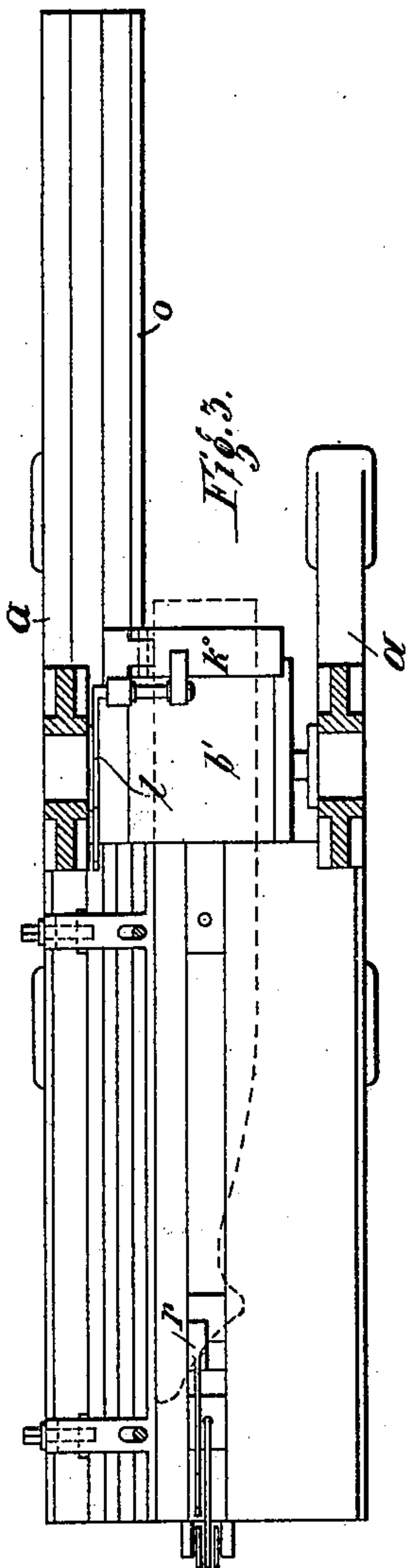
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(No Model.)

3 Sheets—Sheet 2.



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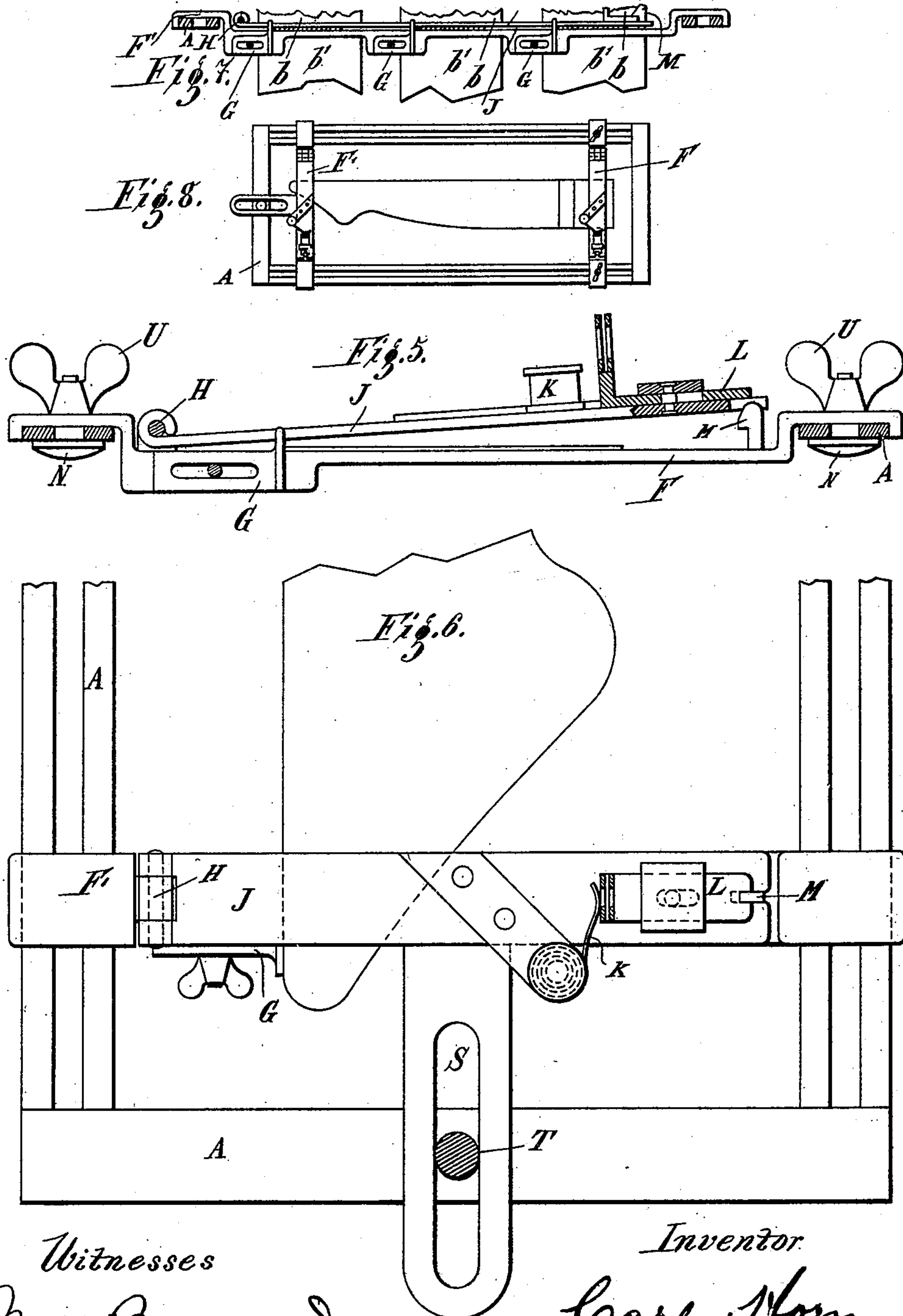
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(No Model.)

3 Sheets—Sheet 3.



Witnesses

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# UNITED STATES PATENT OFFICE.

CARL HORN, OF KAPPEL, GERMANY.

## MACHINE FOR PRINTING STOCKINGS, &c.

SPECIFICATION forming part of Letters Patent No. 631,716, dated August 22, 1899.

Application filed April 7, 1897. Serial No. 631,115. (No model.)

*To all whom it may concern:*

Be it known that I, CARL HORN, residing at Kappel, near Chemnitz, in the Kingdom of Saxony and Empire of Germany, have invented a new and useful Machine for Printing on Both Sides of Stockings, Handkerchiefs, and Similar Articles, (patented in Germany June 26, 1895, No. 85,438,) of which the following is a specification.

10 This invention relates to a machine for printing on both sides of stockings or other articles consisting of extensible fabric in such a manner as to leave the border or edge and the point or toe of the stocking free. This machine may also be employed for printing handkerchiefs and the like goods and is distinguished by the fact that the printing is not striped or clouded at the commencement and at the end of the stocking, but is completely faultless. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a partly-sectional side elevation of one embodiment of my invention. Fig. 1<sup>a</sup> is a detail end view of the adjustable slide for the ink-rolls. Fig. 2 is an end elevation with part of the inking-rollers removed. Fig. 3 is a partly-sectional plan view. Fig. 4 shows a modified construction of the machine in side elevation. Figs. 5, 6, 7, and 8 are detail views.

30 In the frame *a* there are mounted in bearings, so as to be capable of rotation, two rollers *b b'*, the distance between the centers of which is capable of being adjusted for greater or less thickness of the goods to be printed by means of screw-spindles or of intermediate pieces planed to exact measurement. These rollers are adapted to be rotated by means of wheels *c c'* by a crank-handle *d* in such a manner that the design provided on the rollers *b b'* is by the rotation of the rollers transferred on the upper and under sides of the stocking which is passed through and between them, whereby the stocking is printed. 45 The design on the rollers *b b'* is provided with the necessary color by means of the rollers *e, f,* and *g*, which are all driven by means of wheel-gearing (represented at 2 3 4) from the main driving-wheels *c c'* and of which the roller *g* serves to take the requisite color for printing the stocking from a vessel *h* and to transfer it to the rollers *f e* and *b* and *b'*, respectively,

scrapers or doctors *e'* being provided to remove the color in excess and other unevenness from the roller *e*. In order to enable the printing-rollers *b b'* to be readily cleaned, the slide *i* upon which the transferring-rollers *e* and *f* are mounted is adapted to be pushed out forward entirely away from the printing-rollers *b b'* when the pressure screw-holders *k* (which are for this purpose arranged to move vertically in slots) are moved down completely. 55 60

In order to produce a faultlessly clear and sharp design without stripes upon the stockings to be printed, it is absolutely necessary, as has been found by experience, that the stocking should be passed through the printing-rollers with exactly the same velocity with which the design of the printing-rollers *b b'* rolls over the stocking. To produce this result, the machine is provided with a special and automatically-operating feeding apparatus, which is constructed as follows: A ring of teeth *z*, rigidly connected to the lower printing-roller *b'*, acts when the roller *b'* is rotated to move a toothed rack *m*, which is guided in the frame *a* and which carries the clamp-frame or stocking-carrier *k<sup>0</sup>*. Upon the latter the stocking to be printed, which has had a piece of pasteboard inserted therein, is placed with one end on the stocking-carrier *k<sup>0</sup>* and is held by means of a spring-lever *l* or other clamping device. The stocking-carrier *k<sup>0</sup>* is pivoted or hinged to the tooth-rack *m* and is kept in the horizontal carrying position by being supported, by means of the roller *n* provided on its rear side, against the guiding-fillet *o*, provided on the frame *a*. When the whole length of the stocking has passed through the printing-rollers *b b'*, the clamp *l* and also a second clamp *p*, the object and operation of which will be described hereinafter and which holds the stocking by the toe that passes last through the rollers, are disengaged, and the tooth-rack *m* and the stocking-carrier *k<sup>0</sup>* are pushed back into the initial position. The essential characteristic of this automatic feeding apparatus consists, first, in that the toothed rim *z* is arranged on the printing-roller *b'* in such a manner that four to five teeth of the toothed rim-roll upon the tooth-rack *m* before that part (bearing the design) of the rollers *b b'* comes into operation—that is to say, comes into contact with the stock- 65 70 75 80 85 90 95 100



ing to be printed—and, further, in that the pitch circle of the toothed wheel  $z$  is exactly tangential to the horizontal central plane of the stocking to be printed, so that the stocking to be printed meets the design (coated with color) of the rollers  $b b'$  with exactly the same velocity as that with which the said design rolls over the two sides of the stocking, so that by this means there is produced a sharp or clear impression perfectly free from stripes. If the stocking while the printing-rollers  $b b'$  are commencing to print should stop or should be fed with a smaller or with a greater velocity to the rollers, the color upon the design of the rollers  $b b'$  would become prematurely rubbed off and would cause a blurred impression. A slide  $q$ , guided in the frame  $a$ , holds the stocking firmly at the toe by means of the spring-lever  $r$ . The slide  $q$ , sliding loosely in the frame  $a$ , is being constantly drawn backward by means of a weight  $s$ . In order that the stocking held in the toe-holder shall not be stretched by the weight  $s$  before the printing-rollers come in contact with the stocking and so as to prevent the stocking from becoming shifted in consequence of any yielding of the spring-lever  $l$  of the feeding apparatus, which would at once cause the design to appear blurred on the stocking, the weight  $s$  is kept out of operation by means of the support  $t$  until the printing-rollers  $b b'$  have gripped the stocking. This device is capable of modifications for certain purposes, because it does not allow of a continuous working and because the apparatus for feeding the goods, consisting, substantially, of the tooth-rack  $m$  and the clamping device  $l$ , must be returned into the position of rest each time at the termination of the printing operation.

Figs. 4 to 8 illustrate an apparatus which serves to illustrate the further development of the main idea carried out in the first form of construction into a continuous and purely mechanical operation. The feeding apparatus which forms an undetachable part of the machine in the first arrangement is in this case replaced by a suitably removable part, which is shown on the frame A. (Illustrated in Fig. 8.) As a mechanical equivalent for the tooth-rack  $m$  there is employed in this case an endless chain B, upon which are pins E. The frames A are in this case placed over the chain B and engage with the pins E therein, as indicated in Fig. 4. The chain runs over chain-wheels C, arranged at the front and rear ends of the machine, and by means of the pins E carries the frame A along with exactly the same speed as that with which the periphery of the printing-rollers  $b b'$  rolls over the goods—that is to say, feeds them with this speed to the rollers, through the rollers, and away from the rollers. The movement of the feed-chain B is effected by means of two rings of teeth D, arranged on both ends of the lower or upper printing-rollers  $b b'$ . With the object of rendering the

machine as efficient as possible it is built of sufficient length to allow of a large number of frames having stockings fixed in them to be placed at one time upon the feed-chain B in front of the printing-rollers  $b b'$ , and the pins E upon the said chain are arranged in such a manner that the printing-rollers commence to print each stocking at one and the same place.

The frame A (see Figs. 6 and 8) is built in a compact and light manner of iron and is provided with two holders F F', (see Figs. 5, 6, and 8,) which are capable of being adjusted at a distance apart, depending on the length of the stockings to be printed. These holders have covers or lids J, pivoted in hinges H, which can be turned up for the purpose of readily inserting the stockings to be printed and which when turned down are kept closed by means of a bolt L, that is always pressed forward by a spring K, so that the said bolt takes behind a nose M, fixed to F F', as shown in Fig. 5. For the purpose of exactly registering the printing there is provided on each holder F F' an outwardly-movable stop G, (see Fig. 5,) against which the stocking is firmly laid when it is clamped in the apparatus. Further, the one holder F' is adapted to be readily movable in a forked slot S, situated in the center of the frame, so that the said holder can be readily adjusted by means of thumb-screws T for different lengths of stockings, while the other holder F can be adjusted by means of screws N and thumb-nuts U in the lateral part of the frame. If, as shown in Fig. 7, a number of stockings clamped side by side are to be printed simultaneously by means of a number of pairs of rollers  $b b'$ , arranged side by side, the frame A is made correspondingly wide and is provided with a number of stops G for getting the register. The stockings when clamped in are held by means of suitable clamps, as above described.

Fig. 4 shows in dotted lines the arrangement of a second pair of rollers behind the first pair of rollers, this being employed in case it is desired to print in several colors with the new machine. This is of particular importance for printing handkerchiefs.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A machine for printing on both sides of an extensible fabric, comprising a clamp-frame adapted to clamp said fabric at both ends, and hold same in an extended condition, two printing-rollers each having a printing-surface, and means for rotating said rollers and passing the said carrying means, with the fabric, between said rollers at a speed equal to the speed of the printing-surfaces on the rollers.

2. A machine for printing on both sides of an extensible fabric comprising a clamp-frame adapted to clamp said fabric at both ends and to hold same in an extended condition, two rollers each having a printing-sur-



face, an endless chain adapted to engage said frame and carry it between the printing-rollers and means for operating said endless chain.

5 3. A machine for printing on both sides of a plurality of articles composed of extensible fabric, comprising a plurality of pairs of rollers, each roller having a printing-surface, a clamp-frame adapted to clamp a plurality of  
10 said articles at both ends thereof, a chain

adapted to engage said frame and carry the several articles to be printed between the respective pairs of rollers, and means for operating said chain.

In witness whereof I have hereunto set my 15 hand in presence of two witnesses.

CARL HORN.

Witnesses:

B. TOLKORBET,  
MAX ORDMAN.