

No. 670,624.

Patented Mar. 26, 1901.

R. C. SEYMOUR.

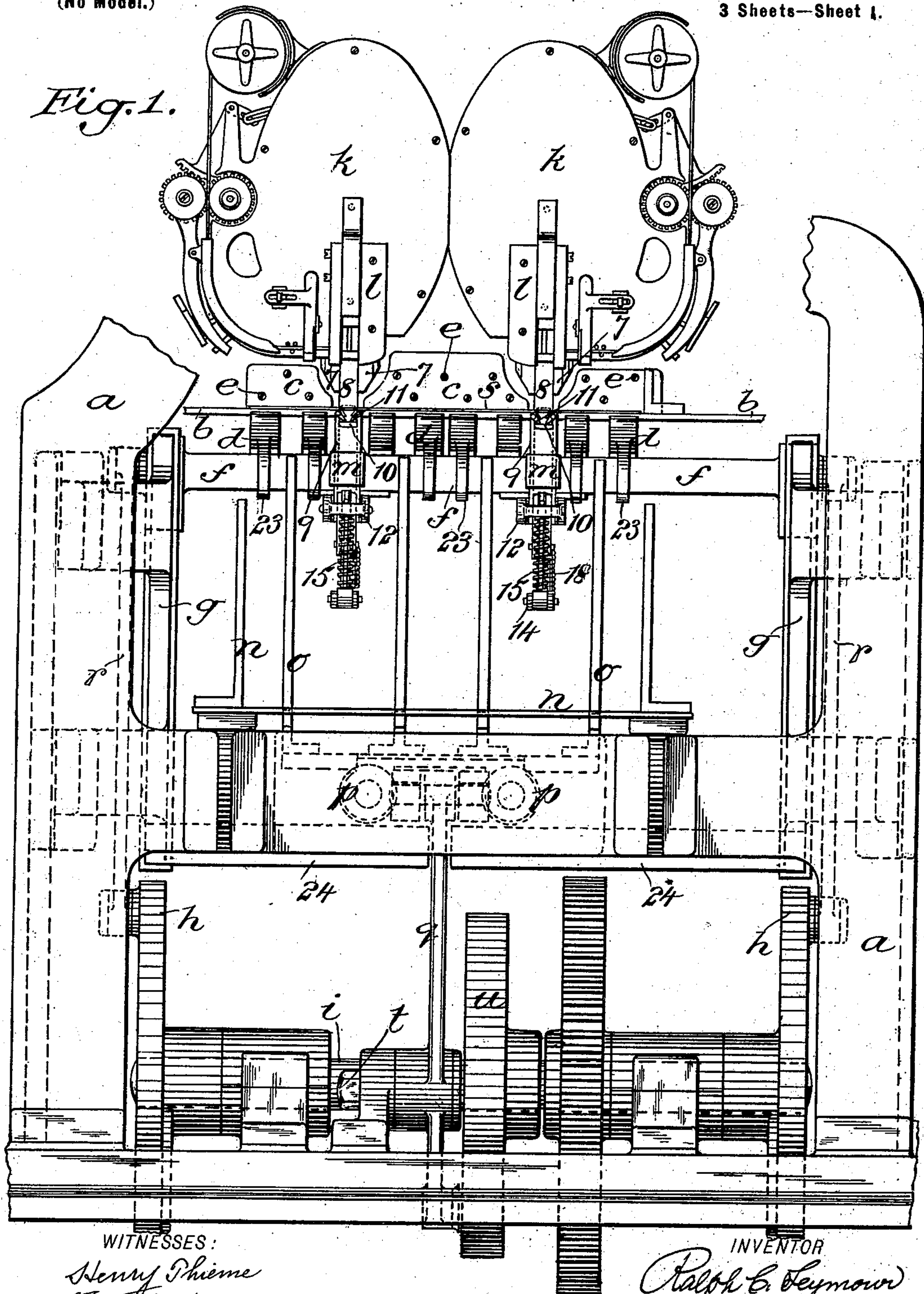
PAPER FOLDING AND STAPLING MACHINE.

(Application filed Dec. 7, 1900.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



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Fred Hagena

INVENTOR

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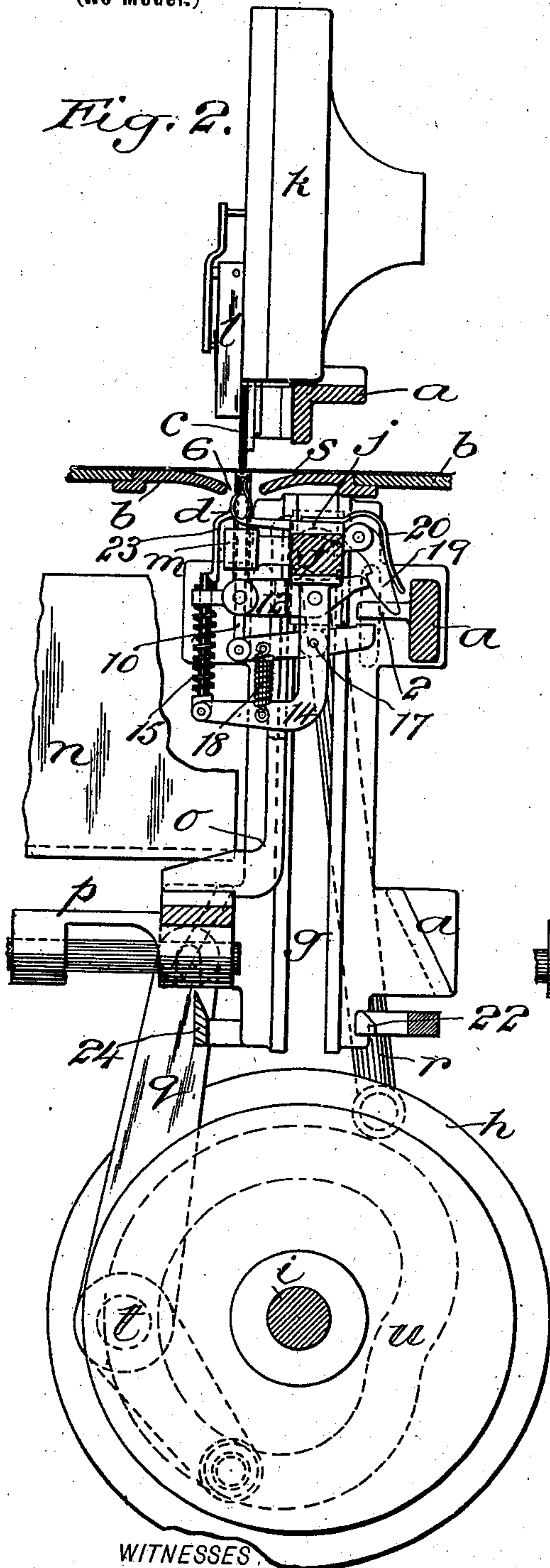
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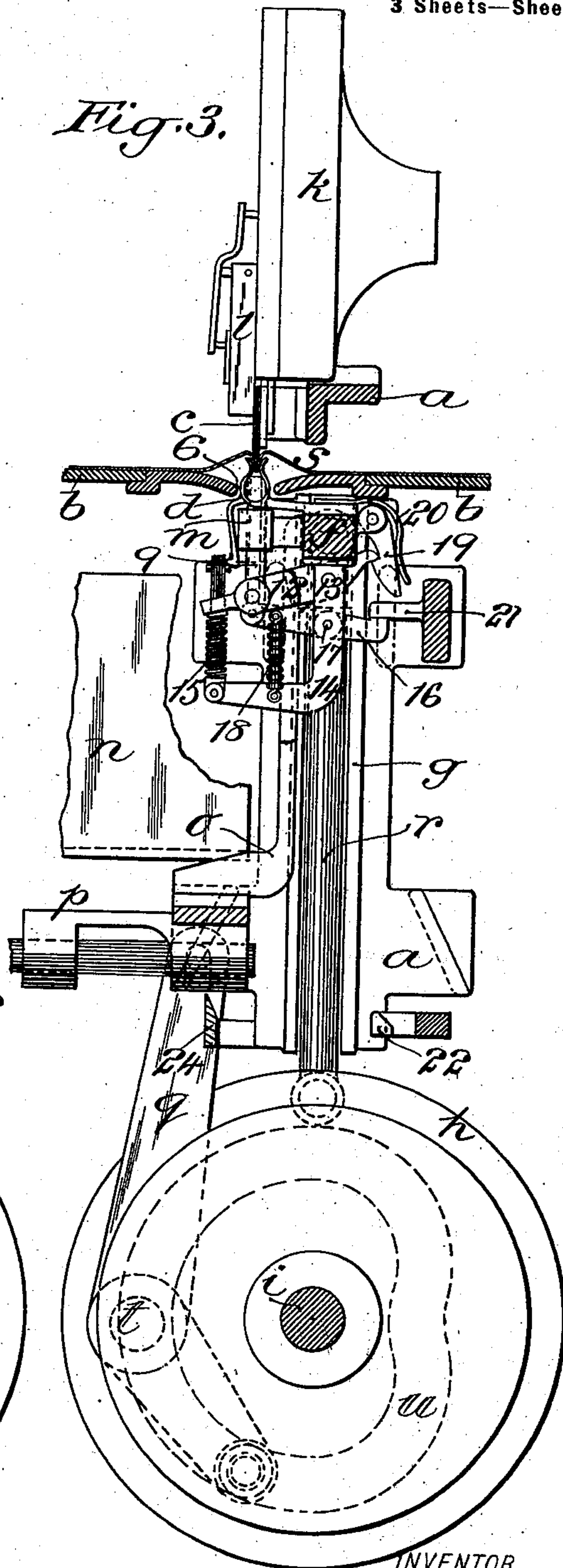
3 Sheets—Sheet 2.

Fig. 2.



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Fig. 3.



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3 Sheets—Sheet 3.

Fig. 4.

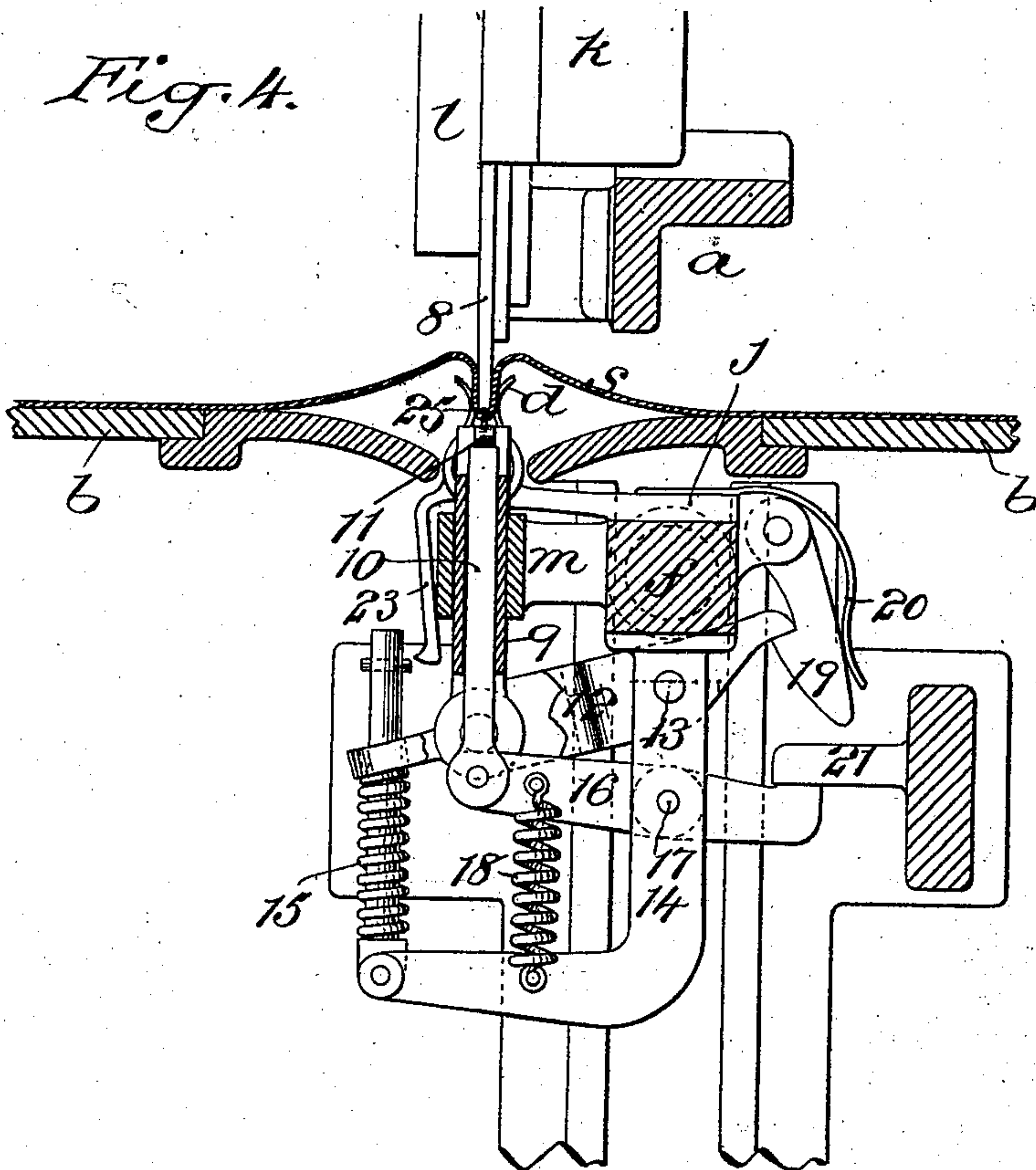
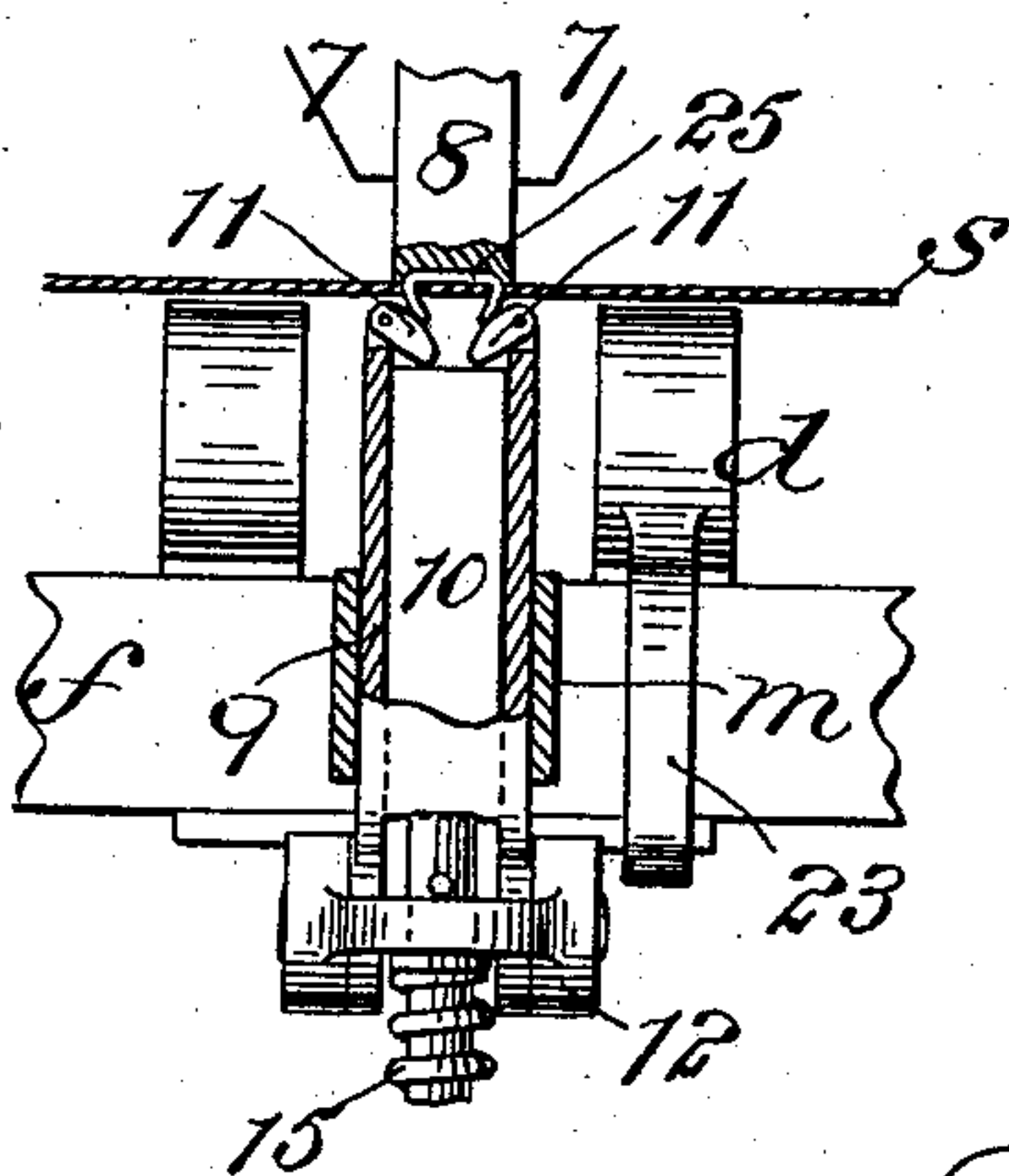


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PAPER FOLDING AND STAPLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 670,624, dated March 26, 1901.

Application filed December 7, 1900. Serial No. 39,006. (No model.)

To all whom it may concern:

Be it known that I, RALPH C. SEYMOUR, a citizen of the United States, and a resident of South Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Folding and Stapling Machines, of which the following is a specification.

This invention relates to machines for folding paper in sheets and for stapling or wire-stitching the folded sheets together.

The most important characteristic of a machine embodying my invention is that it both folds the sheets and inserts and fastens the staples into the folds, the two operations of folding and stapling being performed at the same time; and the invention consists in certain combinations represented in the accompanying drawings and hereinafter described and claimed, whereby those operations are so performed.

Figure 1 of the drawings represents a front elevation of as much of a folding and stapling machine as is necessary to explain the invention. Figs. 2 and 3 are transverse sectional views representing the most important working parts of the machine at different stages of their operation. Fig. 4 is a sectional view corresponding with Fig. 3, showing some of the parts thereof on a larger scale. Fig. 5 is a front view, partly in section, of the parts shown in Fig. 3, but representing them in positions corresponding with Figs. 1 and 2.

Similar letters and numbers of reference designate corresponding parts in all the figures.

a a designate parts of the stationary framing of the machine.

b is the support on which several sheets *s* are deposited, one upon another, by any suitable means to be folded and stapled, said support being represented as a slotted table, such as is common in folding-machines of a certain class.

c is a folding-blade on which the creasing preparatory to folding and the commencement of the folding are performed by sets of grippers *d*, the said blade being stationary at the face of the table, with its edge just above said face, where it is secured by screws *e* to

a portion of the framing, and the said grippers being attached to a carrier, (represented as a bar or cross-head *f*,) which works in vertical guides *g g* below or at the back of the table. This carrier *f* derives a regular reciprocating motion through a rod *r* from a crank *h*, carried by a rotary shaft *i*, to which motion is imparted by any suitable means, the said reciprocating motion being such that it carries the grippers far enough upward, as shown in Fig. 3, to lift the sheets *s* a short distance from the table and crease and grip them upon the blade *c* and far enough downward to carry the whole width of both leaves of the folded sheets through the slot 6 in the table. There may be any suitable number of these grippers arranged in line with each other, and they may be of any suitable kind which permits them to close upon the blade to form a crease in the sheets, as shown in Fig. 1, and to pull the sheets off from the blade and grip them tightly enough to pull them down through the slot in the table, but they are here shown of the simplest form, each composed (see Figs. 2, 3, and 4) of two elastic jaws formed in the same piece with a stem *j*, which is secured on top of the carrier *f*. For the purpose of opening the grippers to release the sheet after the latter has been pulled completely through the slot in the table the outer elastic jaws are each furnished with a downward projection 23, the point of which just before the completion of the downward movement of the carrier runs against a stationary wedge-like projection 24, provided on the machine-framing, and so forces out said jaw away from the other one.

In proper relation to the folding-blade to provide for the insertion of the staples into the crease or incipient fold in the sheets produced by the grippers and the said blade there are arranged a suitable number of staplers, according to the number of staples to be used, (two in the machine represented,) as shown in Fig. 1, each of said staplers being indicated as a whole by the letters *k l*. These staplers may be of any suitable kind, but the kind which I generally propose to use are those which are the subject of United States Patent No. 613,210 of Mackay and Bro-

der, which are now so well known as to need here no illustration or description beyond what is necessary to explain their relation to the folding devices and their coöperation therewith. The said staplers must be so arranged that their staple-bending jaws 7 and staple-drivers 8 may operate to form the staples and drive them through the sheets in line with the edge of the blade *c*, and for this purpose the blade is made in sections or interrupted, as shown in Fig. 1, at the places the staples are to be driven, and the staplers are arranged opposite to and partly within these interruptions. The height of the staplers and the stroke of their drivers are so regulated that the latter will drive the staples immediately after the sheets have been deposited upon the table and while they lie flat thereon, as shown in Figs. 1 and 2, just before the points of the grippers in their ascent have been projected above the face of the table.

Opposite to the staple-drivers and side by side with the grippers at intervals between the latter the staple-clenchers 9 10 11 are carried by the carrier *f* in guides *m*, attached to the latter. These clenchers, except that they are so carried and are organized to operate in connection with the folding-grippers, are or may be substantially like those in common use in stapling or wire-stitching machines—that is to say, they consist each, as is common, of an outer member 9 and an inner member 10, the outer member 9 being a plunger, which is fitted to slide vertically within its guide *m*, and the inner member 10 being a plunger fitted to slide through the plunger 9, which has hinged to its upper end two swages 11, (see particularly Fig. 5,) which overlap the upper end of the plunger 10, the said plungers and swages serving the purpose of turning in the prongs of the staples. The plunger 9 is connected at its lower end with one end of a lever 12, which has its fulcrum 13 in a rigid hanger 14, dependent from the carrier *f*, and it has applied between its front end and the said hanger an upwardly-pushing spring 15. The plunger 10 is connected at its lower end with one end of a lever 16, which has its fulcrum 17 in said hanger 14, and it is connected with said hanger by a downwardly-pulling spring 18. At the opposite end of the lever 12 to that at which the plunger 9 is connected there is pivoted to the carrier *f* a latch-hook 19, which is pressed against said lever by a spring 20, and above the opposite end of the lever 16 to that at which the plunger 10 is connected there is rigidly affixed to a part of the stationary framing of the machine a stop 21, with which the said lever 16 comes in contact, as shown in Figs. 3 and 4, for the purpose of pushing up the plunger 10 while the carrier *f* is completing its upward stroke. Lower down on the said framing there is within the range of the latch-hook 19 a fixed tripping-piece 22 for

the purpose of throwing back the said latch-hook and liberating the lever 12 therefrom as the carrier *f* approaches the lower end of its stroke and allowing the spring 15 to push up the plunger 9.

The several parts and their individual operations having now been described, I will proceed to describe their related and combined operations for folding and stapling, first supposing the parts to be in the relative positions shown in Figs. 1, 2, and 5. The carrier *f* has not quite completed its upward stroke and the points of the grippers have not quite reached the sheets *s*, which are flat on the table *b*. The staples produced by the staplers in the usual way have just been driven by the drivers 8 through the sheets, and the plungers of the clencher, having moved up, together with the carrier *f*, have partly closed in the prongs of the staples 25, as shown in Figs. 1 and 5, by means of their swages 11, while the paper around the staples has been supported by the upper ends of the plungers. The continued upward movement of the carrier, while the staple-drivers 8 remain pressed on the staples, brings the levers 16 into contact with the stops 21, while the outer plunger is held down by the staple-driver, and so causes the said levers to drive the inner plungers 10 upward against the swages 11 faster than the carrier *f* moves up with the grippers, and the swages are thus turned upward and caused to turn in the prongs of the staples and clench the latter. The further continuation and completion of upward movement of the carrier takes the grippers through the slot in the table and causes them to crease the sheets on the folding-blade, as shown in Figs. 3 and 4. During this last portion of its upward movement the carrier, taking with it the fulcrums of the levers 12, while their attached plungers 9 are held down by the staple-drivers, takes the rear ends of said levers above the hooks of their latches 19, which then spring under the said ends, as shown in Fig. 3, and lock said plungers down against the upward pressure of their springs 15 and so prevent said plungers from rising and pushing the crease or bight of the fold of the sheets out from the grippers during the downward movement of the latter with the carrier. As the carrier with the grippers and clenchers complete their downward movement, the projections 23 of the grippers run against the stationary projections 24 and open the grippers to liberate the sheets and the latches 19 strike the tripping-piece 22 and liberate the plunger-levers 12, which are then caused by their springs 15 to resume their position first described with respect to the carrier, ready for repeating the operation hereinbefore described during the upward movement of the carrier.

I have represented in part in Figs. 1, 2, and 3 the packers for the reception of the folded and stapled sheets as they are liberated from

the grippers; but as these are such as are common to other folding-machines it is not necessary to describe them further than is necessary to prevent their confusion in the drawings with those parts to which my invention relates. In the figures just referred to, *n* designates the packing-boxes, *o* the packers, and *p* the slides, to which the latter are attached and which are actuated by a lever *q*, working on a fixed fulcrum *t* and deriving motion from a cam *u* on the shaft *i*.

What I claim as my invention is—

1. In a machine for folding and stapling sheets, the combination of a blade and grippers coöperating therewith to crease and fold the sheets, means for inserting staples through said sheets in the line of fold, and clenching devices for clenching the so-inserted staples during the coöperative action of said grippers and blade, substantially as herein described.

2. In a machine for folding and stapling sheets, the combination of a folding-blade interrupted at intervals in its length, grippers coöperating with said blade between its interruptions to crease and fold the sheets, and stapling devices arranged opposite to and partly within the interruptions in the folding-blade, each set of stapling devices intervening between two sets of grippers, substantially as herein described.

3. In a machine for folding and stapling sheets, the combination of a sheet-support in which is an opening, a folding-blade arranged at the face of said support opposite said opening, stapling devices also at the face of said support opposite said opening, a reciprocating carrier beneath said support, grippers attached to said carrier and operating through said opening to crease and fold sheets on the edge of said blade, and staple-clenching devices attached to said carrier, all substantially as herein described for both folding the sheets and stapling them.

4. In a machine for folding and stapling sheets, the combination of a slotted table, a folding-blade stationary above said table opposite the slot therein, means arranged above the table for inserting staples through sheets deposited on said table, a carrier situated below and having a reciprocating motion toward and from said table, grippers attached to said carrier for coöperating with said blade for taking sheets from said table and folding them, and clenching devices attached to said carrier for clenching the staples during the

folding operation, substantially as herein described.

5. In a machine for folding and stapling sheets, the combination of a folding-blade, grippers and a carrier therefor having a reciprocating movement for the purpose of folding sheets on said blade and withdrawing the folded sheets therefrom, devices for inserting staples through the sheets to be so folded, and clenching devices attached to said carrier but having movements independently thereof toward and from said blade and the staple-inserting devices, substantially as herein described.

6. In a machine for folding and stapling sheets, the combination with staple-inserting devices, a folding-blade and folding-grippers and a reciprocating carrier for said grippers, of staple-clenching devices consisting of two plungers working one within the other and a guide on said carrier in which said plungers are independently movable with respect to each other and to the grippers, and means through which said plungers derive their independent movements from the movement of the carrier, substantially as herein described.

7. The combination with the staple-inserting devices, the folding-blade and the reciprocating gripper-carrier and folding-grippers thereto attached, of two staple-clenching plungers, a guide attached to said carrier in which said plungers are capable of sliding one within the other, levers fulcrumed to the carrier for operating said plungers, a spring between the carrier and the lever of the outer plunger for forcing forward said plunger between the grippers, a spring between the carrier and the lever of the inner plunger for drawing back said plunger from between the grippers, a stationary stop within range of the last-mentioned lever for producing the forcing forward of the inner plunger between the grippers, a latch for locking the first-mentioned lever to hold back the outer plunger between the grippers, and a stationary tripping-piece for disengaging said latch by the movement of the carrier, all substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 5th day of December, 1900.

RALPH C. SEYMOUR.

Witnesses:

FREDK. HAYNES,
GEORGE BARRY, Jr.