

No. 656,897.

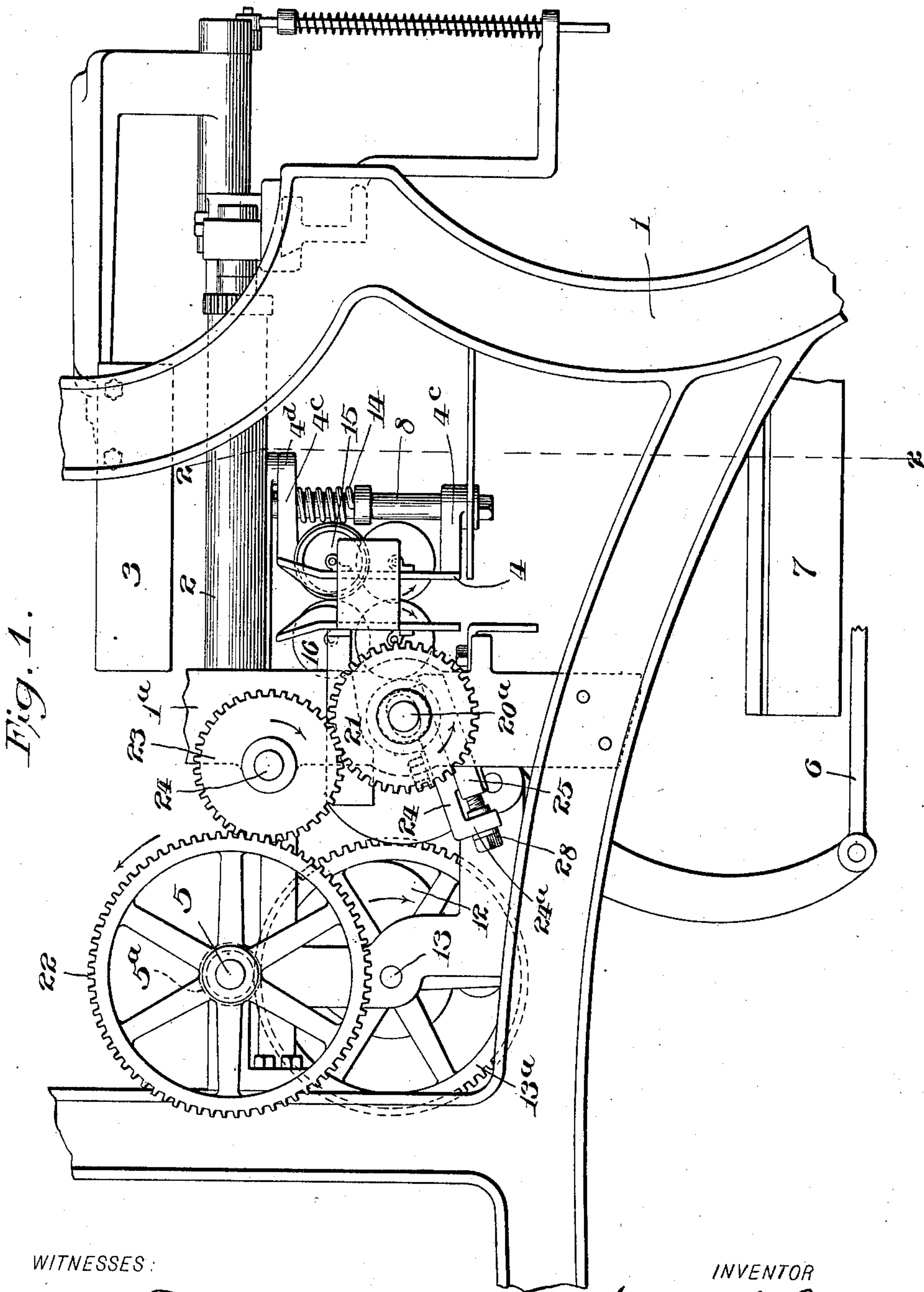
Patented Aug. 28, 1900.

H. K. KING.
PAPER FOLDING MACHINE.

(Application filed Apr. 11, 1900.)

(No Model.)

3 Sheets—Sheet 1.



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3 Sheets—Sheet 2.

Fig. 2.

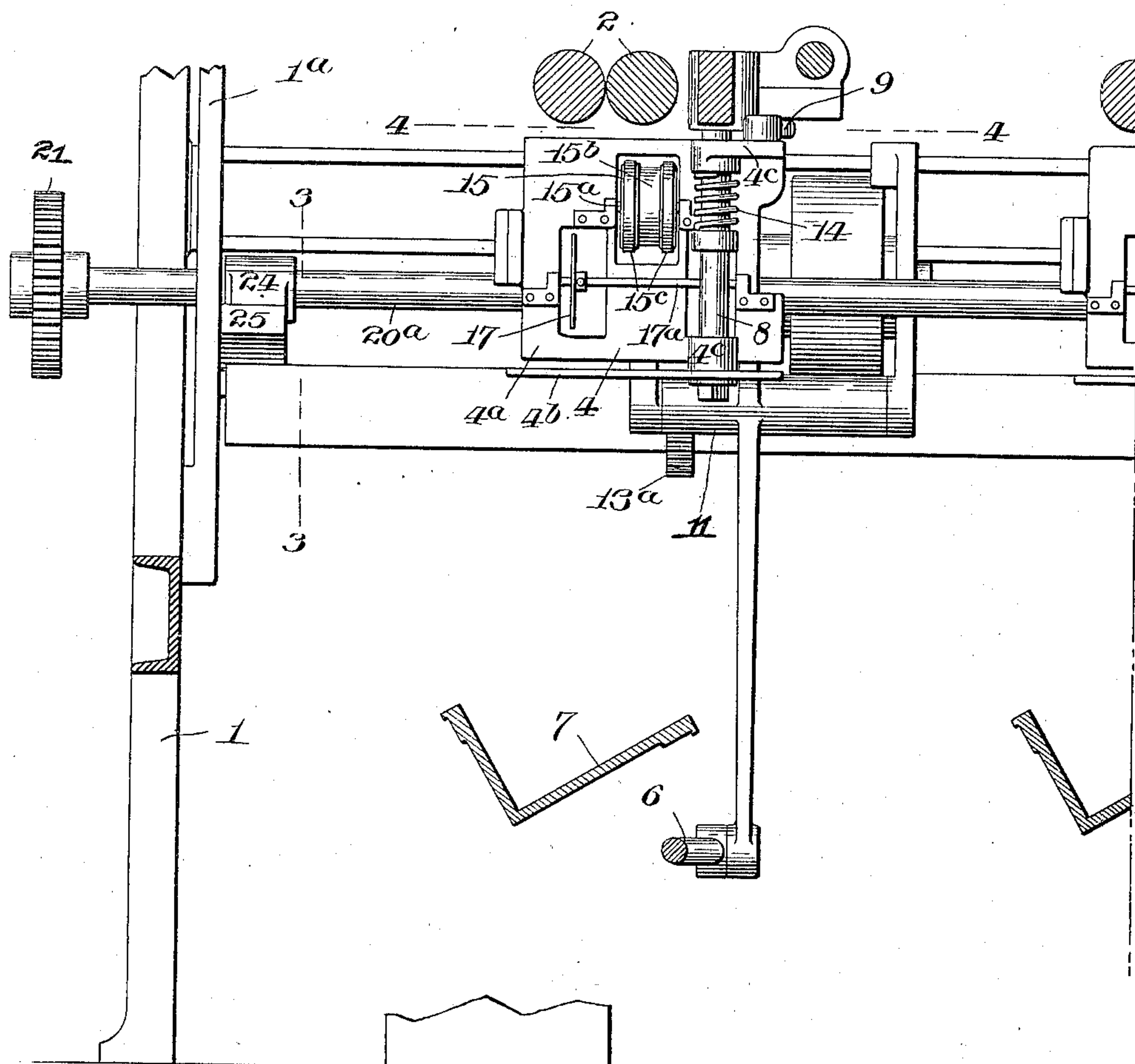
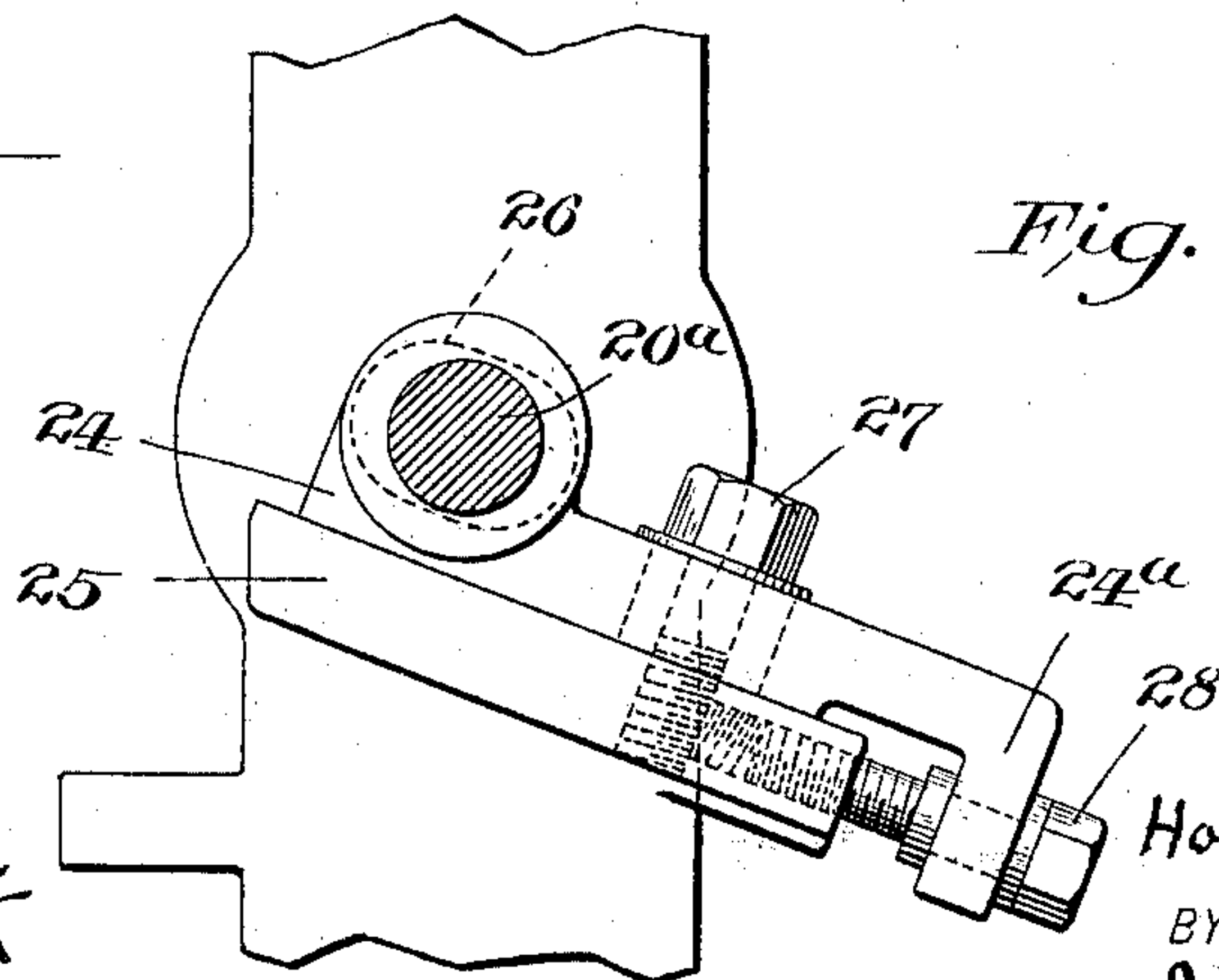


Fig. 3.



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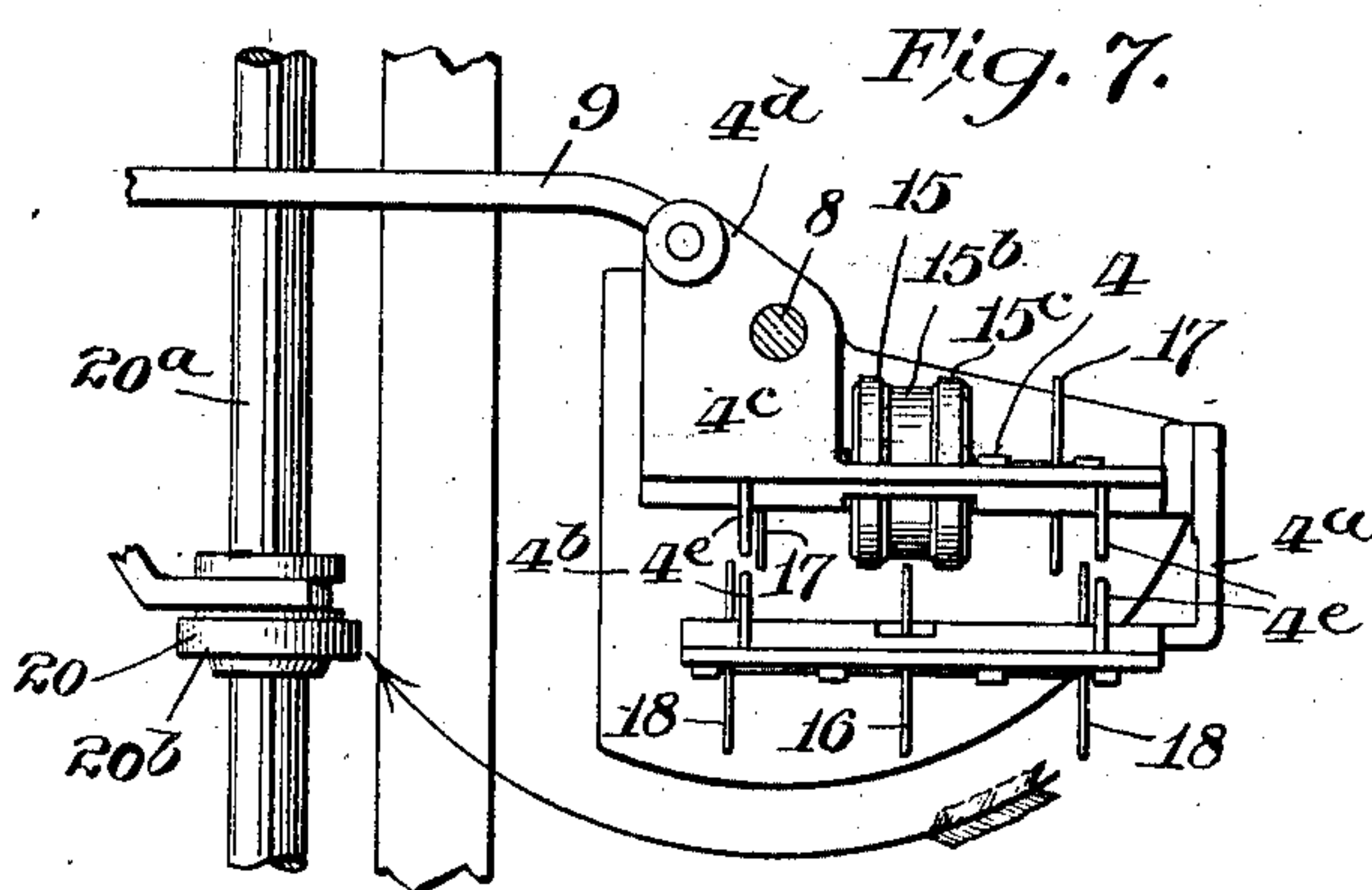
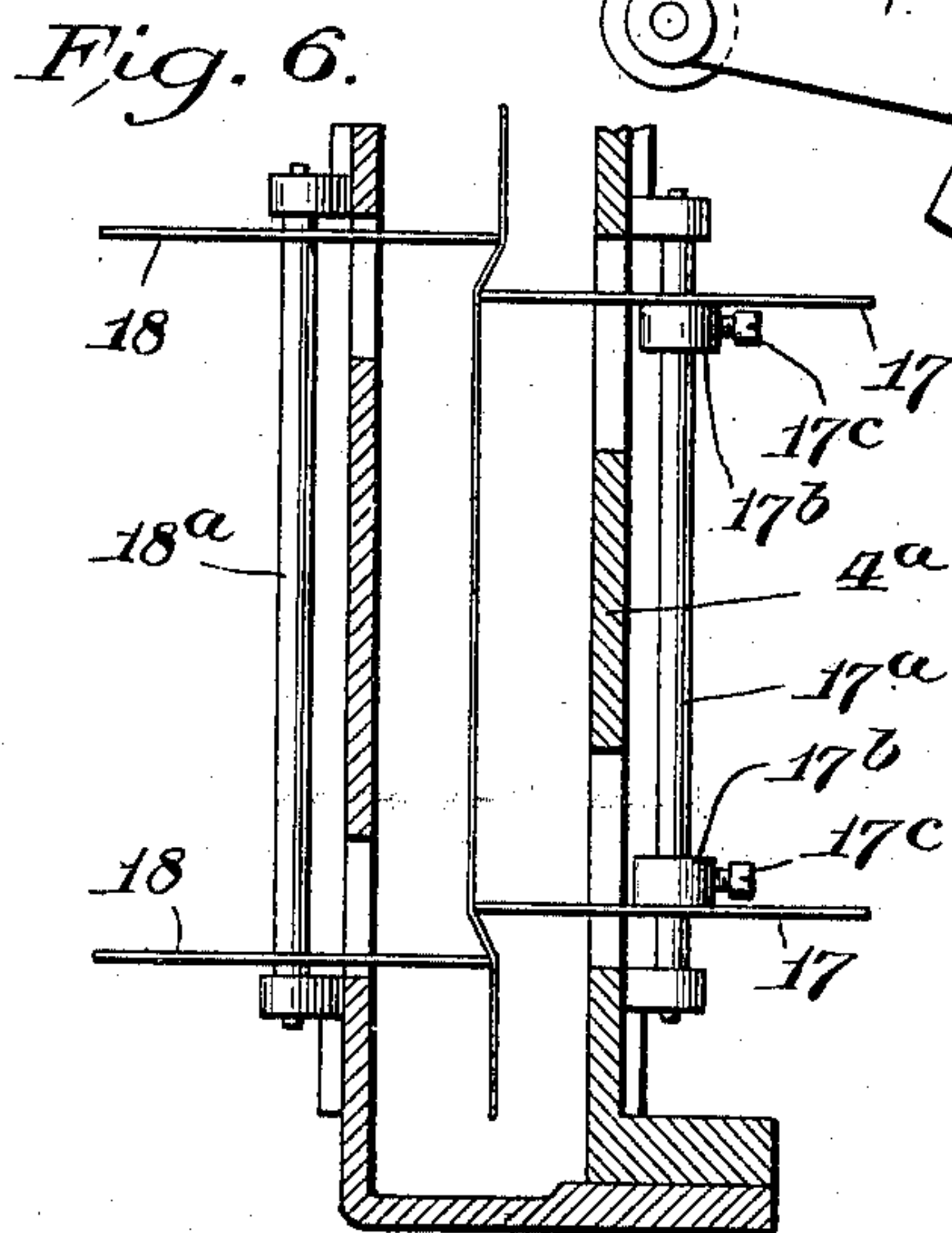
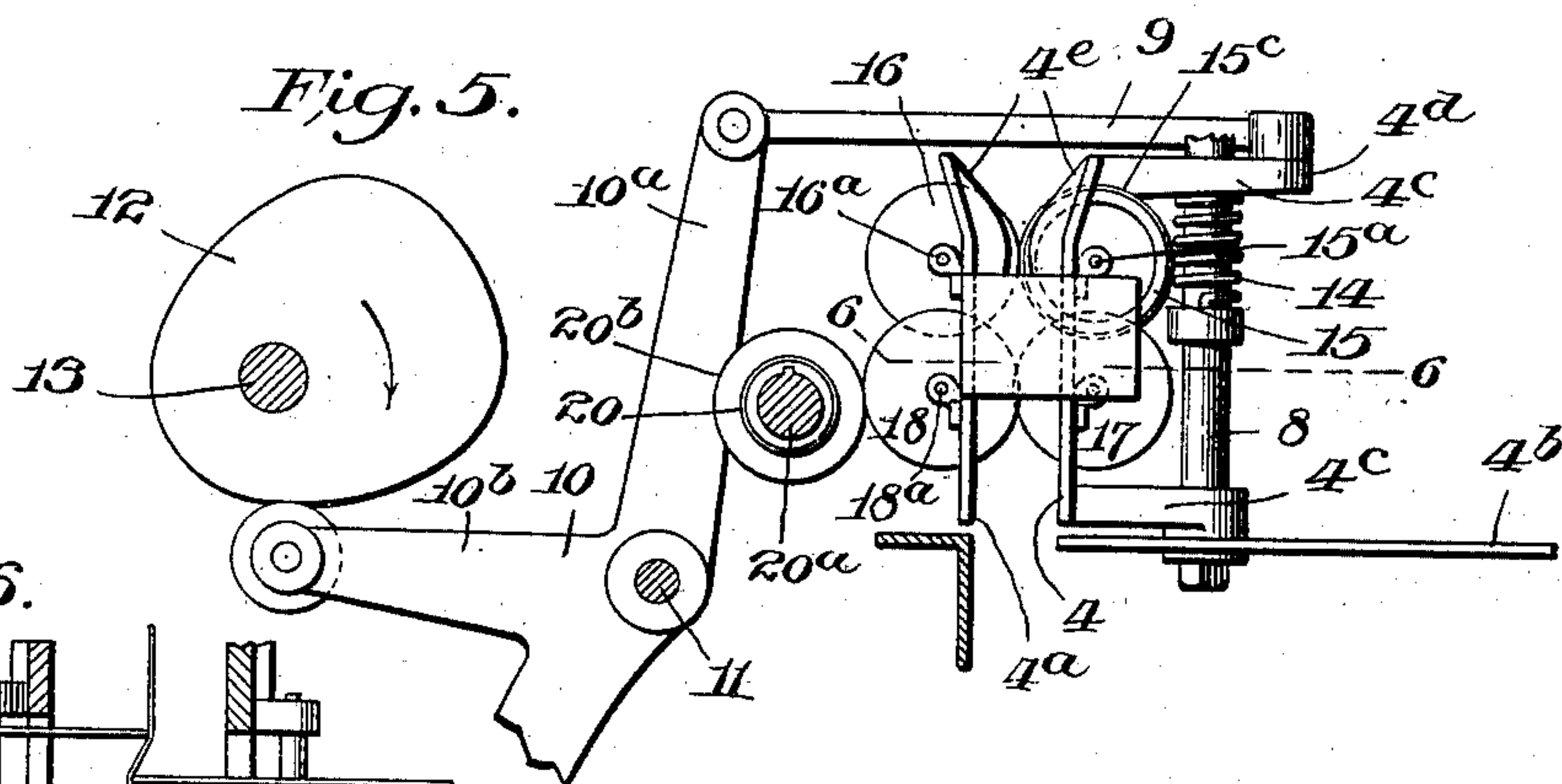
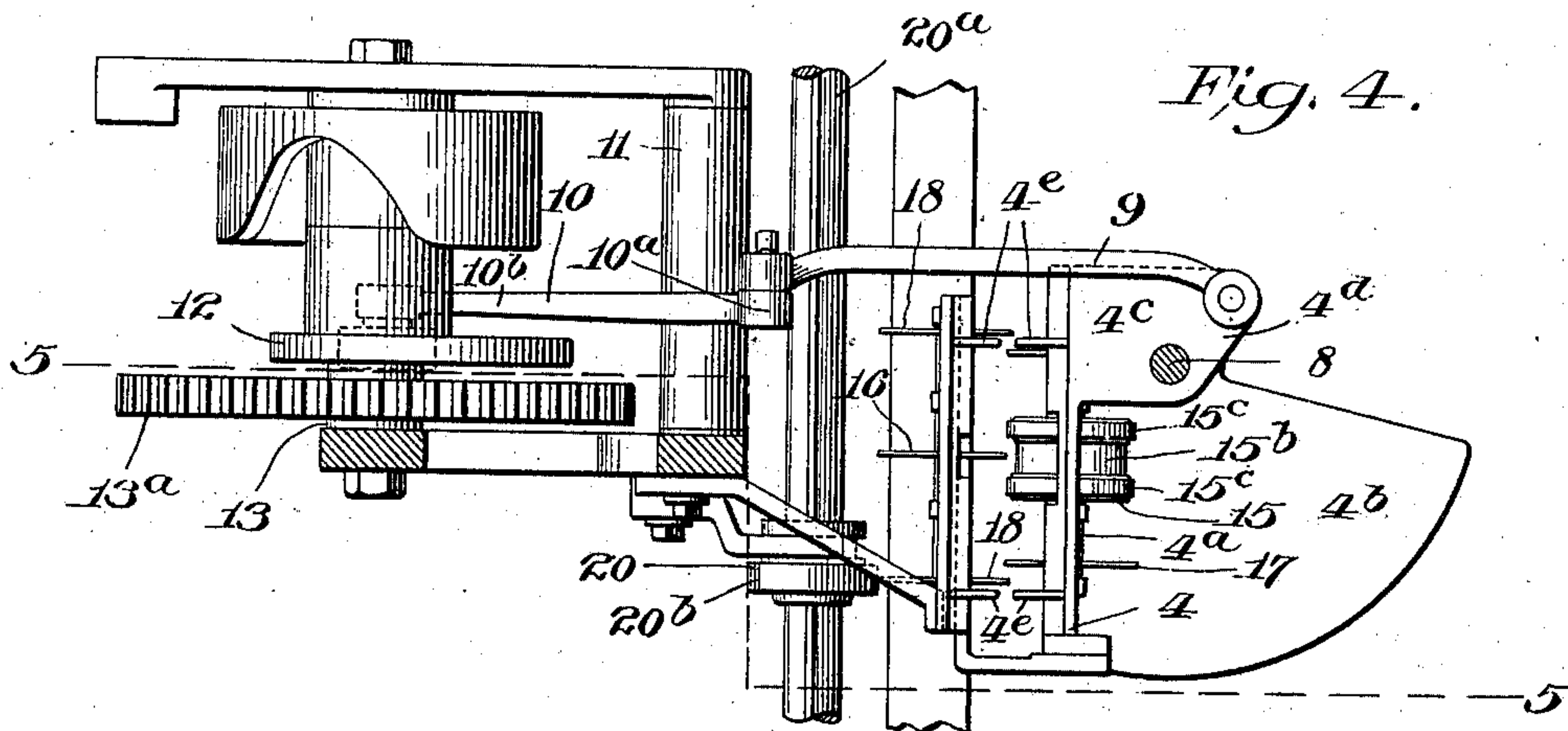
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

HOWARD K. KING, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE CHAMBERS BROTHERS COMPANY, OF SAME PLACE.

PAPER-FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 656,897, dated August 28, 1900.

Application filed April 11, 1900. Serial No. 12,402. (No model.)

To all whom it may concern:

Be it known that I, HOWARD K. KING, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Paper-Folding Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

10 Figure 1, Sheet 1, is a side elevation of a part of a folding-machine to which my invention is applied, the transfer-box of the shoo-fly being in position to deliver the sheets to the packing-trough. Fig. 2, Sheet 2, is a section as on line 2 2, Fig. 1. Fig. 3 is a section enlarged as on line 3 3, Fig. 2, showing the means for laterally adjusting the shaft that carries the roller for driving the lower disk wheels of the shoo-fly. Fig. 4, Sheet 3, is a section broken away as on line 4 4, Fig. 2. Fig. 5 is a section as on line 5 5, Fig. 4. Fig. 6 is a section enlarged as on line 6 6, Fig. 5. Fig. 7 is a plan view similar to a corresponding part of Fig. 4, but showing the transfer-box in the sheet-receiving position.

25 This invention relates to that kind of folding-machines wherein the finally-folded sheet or signature passes from the last set of folding-rollers into a "shoo-fly," whence it is delivered into an underlying packing-trough.

30 The object of the invention is to provide an improved mechanism for insuring the positive and proper delivery of the signatures from the said folding-rollers and the shoo-fly to the packing-trough.

35 The leading feature of the invention comprises two opposite sets of rotatable rollers journaled in bearings of the transfer-box of the shoo-fly and projecting into said box, whereby the folded sheet or signature coming from the folding-rollers passes between and in contact with the first-mentioned rollers until the folded edge of the signature rests upon the usual quadrant-table of the shoo-fly, and when the transfer-box is swung around into position for delivery of the signature to the packing-trough a roller of one of said sets will be brought into contact with a positively-driven roller which rotates said sets of rollers, whereby they will carry down the signature from said transfer-box, whence

it (the signature) falls into the packing-trough, all as hereinafter particularly described.

Other features of the invention relate to details of construction and combinations, also hereinafter described.

Referring to the accompanying drawings, 1 designates a portion of the frame of the folding-machine; 2, the last set of folding-rollers; 3, Fig. 1, the usual folding-blade that tucks the sheet into the bite of said rollers. The mechanism for driving the latter and the folding-blade being well known requires no particular description.

4 is the shoo-fly, which is similar in general form and construction to the shoo-flies in common use, in so much as it consists of a pivoted transfer-box 4^a, open at the top and bottom, with its flaring mouth normally in line with the folding-rollers 2, with means for swinging it on its pivot in the arc of a circle, so as to bring the same into position to deliver into the subjacent packing-trough and returning it to the original position, together with a quadrant-table 4^b, upon which the lower edge of the folded sheet or signature rests when the latter descends from the said folding-rollers through the transfer-box.

4^c indicates the usual opposite guide-plates projecting inwardly from the sides of the transfer-box.

5 is the main shaft of the machine, that is driven from a suitable source of power, and which, through the medium of suitable gears and connections, actuates the folding-rollers, the folding-blade, the rod 6 of the plunger of the packing-trough 7, the shoo-fly, and certain of the mechanism combined with the latter for aiding in accomplishing the result which is the object of my invention, as hereinafter described.

The arms 4^c, to which the transfer-box is attached, are pivoted upon a vertical standard 8. To an extension 4^d of the upper one of these arms is pivoted one end of a rod 9, whose other end is pivoted to the vertical limb 10^a of a bell-crank lever 10, that is fulcrumed on a stud 11, fixed to the frame of the folding-machine. The horizontal limb 10^b of said lever carries a roller at its free end that bears against the face of a cam 12

upon a shaft 13, which is driven from the main shaft 5 in the direction of the arrow in Figs. 1 and 5 through the medium of a pinion 5^a, (indicated by dotted lines in Fig. 1,) that engages a gear 13^a on shaft 13. The said cam in its rotation actuates the bell-crank lever 10 and so swings the transfer-box against the stress of the usual spring 14, mounted upon standard 8, from its normal position for receiving the signatures from the folding-rollers, as in Fig. 7, into position (shown in Figs. 1, 2, 4, and 5) for delivery of the signatures to the packing-trough. The mechanism just described is well known.

I shall now proceed to describe the mechanism and devices of my invention, the mode of operation and the results attained thereby, as follows:

Mounted upon a freely-rotatable shaft 15^a, that is journaled in suitable bearings of that side of the transfer-box, is a wheel or roller 15, having a groove or depression 15^b in its face and projecting into the transfer-box through an opening in the wall thereof, somewhat beyond a vertical plane passing midway between the inner sides of said box. Mounted upon a freely-rotatable shaft 16^a, that is journaled in bearings in the other side of the transfer-box, is a narrow-faced wheel or circular disk 16, that, similarly to wheel 15, projects beyond the middle line of the transfer-box and is about midway between the salient parts of the periphery of said wheel 15, as seen in Figs. 4 and 7. For a purpose hereinafter appearing wheel 15 is made comparatively broad and heavy, so that when started in motion its tendency will be to continue in rotation by its momentum. The two salient peripheral parts of the wheel are preferably each covered with a band 15^c, of india-rubber or other frictional material. On a shaft 17^a, below and parallel with the said shaft 15^a, which carries the wheel 15, and journaled in bearings on that side of the transfer-box, are mounted two narrow wheels or disks 17, similar to 16, one on each side of the line of the wheel 15.

On a shaft 18^a, below and parallel with the shaft 16^a and journaled in bearings in the side of the transfer-box, are mounted two disk wheels 18, similar to disks 16 and 17. These several disks project a short distance beyond the middle line of the transfer-box, similarly to the opposed upper wheels 15 and 16. The two disks 17 extend between the two disks 18, as seen most clearly in Fig. 6, and each of the one pair of disks 17 is adjustable longitudinally on its shaft in order to alter the distance between the disk and the adjacent disk of the opposite pair. In the present instance the said adjustable disks are provided with hubs 17^b, Fig. 6, and a set-screw 17^c for securing the disk in any position to which it may be adjusted.

On a rotatable shaft 20^a, journaled in the frame of the machine and running parallel, or substantially so, with the shaft 18^a, is fixed

or keyed a wheel 20, so placed thereon that when the transfer-box is swung around into position for delivery of the folded sheets or signatures to the packing-trough the periphery of one of the disks 18 (in this instance the outer one of said disks) will come into contact with the periphery of the said wheel 20, as clearly seen in Figs. 1, 4, and 5. The shaft 20^a, and consequently wheel 20, is driven in the direction of the arrow in Fig. 1 from the main shaft 5 through the medium of a gear 21 thereon, a gear 22 on the end of the shaft 20^a, and an intermediate idler-gear 23, Fig. 1, mounted on a stud 24, secured to the frame-upright 1^a.

The peripheries of the disk wheels 16, 17, and 18 are milled or otherwise provided with a frictional surface, so as to obviate slipping against the signature passing between them, as hereinafter described.

Having thus described the construction of my invention, I shall now explain the mode of operation thereof, as follows: The transfer-box of the shoo-fly being in position over the quadrant 4^b, as in Fig. 7, at which time the box is in line with the folding-rollers 3, the folded edge of the signature coming from the said rollers is carried down between the wheel 15 and the opposed disk 16 and between the guide-plates 4^a, and after the signature has entirely escaped from the folding rolls the momentum that has been imparted to wheel 15 continues to carry it (the signature) down between said wheel and disk and between the peripheries of the light disks 17 and 18, which are light and easily rotatable, until finally the folded edge of the signature rests upon the top of the quadrant-table, (the signature) being, however, still held by and between the said disks 17 and 18. The relative timing of the cam 12, that operates in conjunction with the spring 14 to oscillate the transfer-box, is such as to cause the latter to change from the position shown in Fig. 7 to the position over the packing-trough, as in Figs. 1, 2, 4, and 5. When, however, the box is shifted to this position, the periphery of the disk 18 opposite to the positively-driven wheel 20 comes into contact with the latter, consequently both of the disks 18 being positively driven, and the signature, which, as seen in Fig. 6, is bent on two lines by reason of what may be termed the "staggering" of the disks 17 and 18, will be carried down between the bites of said disks out of the transfer-box, whence it falls into the subjacent packing-trough 7.

In order to obviate slipping, and thus insure the driving of the disk 18, I usually cover the periphery of wheel 20 with a band 20^b, of india-rubber or the like. It is also desirable that the said wheel 20 shall be adjustable to and fro transversely with relation to contiguity with the opposed disk 18. To that end I mount the ends of the shaft 20^a of said wheel in adjustable bearings, one of which is shown in Figs. 2 and 3 and in part in Fig. 1, the said

shaft being journaled in a piece 24, that is adapted to slide upon the inclined top of a ledge or projection 25 on the inner side of the frame-upright 1^a, the said shaft extending
 5 through a longitudinal slot 26 (indicated by dotted lines in Fig. 3) in the said upright. The bearing-piece 24 is secured to the ledge 25 by means of a bolt 27, that passes through a longitudinal slot (indicated by dotted lines
 10 in Fig. 3) in said piece. The latter is adjusted so as to bring the wheel 20 into required relation to the disk 18 by means of a bolt 28, that extends through a downward projection 24^a of the piece 24 and is screwed into the
 15 end of the inclined ledge 25.

The purpose of the described arrangement of the momentum-wheel 15 and disk 16, or, in other words, the staggering of the latter and the salient parts of the periphery of said
 20 wheel, is to secure a proper bite of the signature between the wheel and disk and the freedom of rotation by its momentum of the wheel. The purpose of using the lower sets of disks 17 and 18 in the staggered relation
 25 shown and described is to insure the retention and even progress of the signature when the one set of disks is driven by the rotating wheel 20 and the proper delivery of the signature to the packing-trough.

30 The object of having one set of disks adjustable longitudinally with relation to the other set, as hereinbefore described, is to adapt the device for paper of different thicknesses, as obviously adjacent disks should
 35 be nearer together for signatures from thin paper than for signatures of thicker paper, for the sharpness of the bend given to the signature passing between the two disks should be less in the case of thick than with thin
 40 paper.

It will be seen that the signature before it leaves the transfer-box to descend into the packing-trough remains in the control of the rollers or disks within said box, and thus can-
 45 not become displaced, and so will be caused to descend into proper position in the packing-trough. The upper set of rollers—that is, the momentum-wheel 15 and the disk 16—may be dispensed with when the signatures
 50 are of comparatively-large dimensions. The object in using said wheel and disk is to adapt the device for use with signatures of any size which the particular folding-machine is capable of turning out.

55 I remark that it is not essential to the successful operation of my invention that the momentum-wheel shall have salient parts staggered with relation to the disk 16, as described. Nor is it essential that the sets of
 60 disks 16 and 18 shall be staggered, the sole purpose of the staggering in each case being to secure such a bite upon the signature that undue friction will be avoided in order that the roller and disk may freely rotate. Thus
 65 the roller and disk may be directly opposed to each other and the periphery of the one

maintained normally against or closely adjacent to the other by means of a suitable spring. It is the same with regard to the lower sets of rollers or disks 16 and 18. In either case—
 70 *i. e.*, either with staggered or spring-controlled wheels and disks—the bite upon the signature will be an elastic or yielding one, thus accommodating itself to the varying thicknesses of signatures.

75 Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a shoo-fly for folding-machines, the combination of the transfer-box, two opposed
 80 sets of freely-revoluble wheels or disks, journaled to said box and projecting into the same, and the positively-driven wheel against which one of the first-mentioned wheels is adapted to impinge when the transfer-box is
 85 swung into position over the packing-trough, substantially as and for the purpose set forth.

2. In a shoo-fly for folding-machines, the combination of the transfer-box, the freely-revoluble momentum-wheel and a disk or
 90 wheel opposed thereto, the two opposed sets of freely-revoluble wheels or disks, subjacent to said wheel and first-mentioned wheels, said several wheels being journaled to the transfer-box and projecting into the same, together
 95 with the positively-driven wheel against which one of the lower wheels or disks, when the transfer-box is swung into position over the packing-trough, substantially as and for the purpose set forth.

3. In a shoo-fly for folding-machines, the combination of the transfer-box, the revoluble momentum-wheel, the revoluble disk opposite thereto, said disk and salient peripheral part of said wheel being staggered, the
 105 two sets of revoluble disks subjacent to the said wheel and first-mentioned disk, and relatively staggered, and the positively-driven wheel against which one of said subjacent disks is adapted to impinge when the transfer-box is brought into position over the pack-
 110 ing-trough, substantially as and for the purpose set forth.

4. In a shoo-fly for folding-machines, the combination of the transfer-box, the revoluble
 115 grooved momentum-wheel, the revoluble disk, 16, said wheel and disk being arranged relatively as shown, the two lower sets of revoluble disks, arranged relatively to each other and to the said wheel and disk as shown,
 120 and means for longitudinal adjustment of the disks of one of said sets, with relation to those of the other set, substantially as and for the purpose set forth.

In testimony whereof I have hereunto af-
 125 fixed my signature this 2d day of February, A. D. 1900.

HOWARD K. KING.

Witnesses:

WALTER C. PUSEY,
 JOSHUA PUSEY.