

(No Model.)

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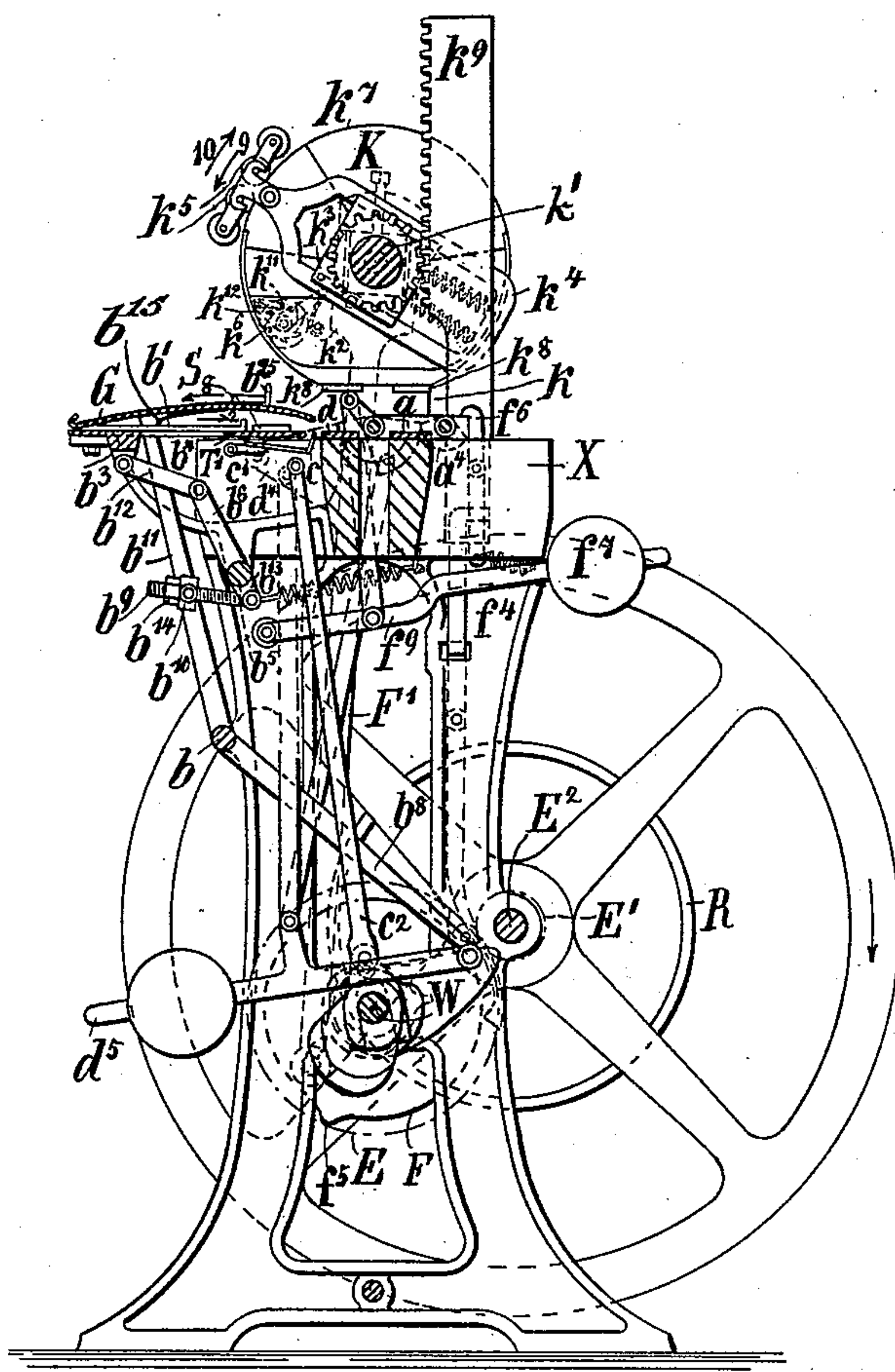
M. KÜSTERMANN & H. GOTTSCHALK.

MACHINE FOR PRINTING ON MATCHES.

No. 495,095.

Patented Apr. 11, 1893.

FIG. 1.



Witnesses:

H. G. Dieterich  
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Inventors:

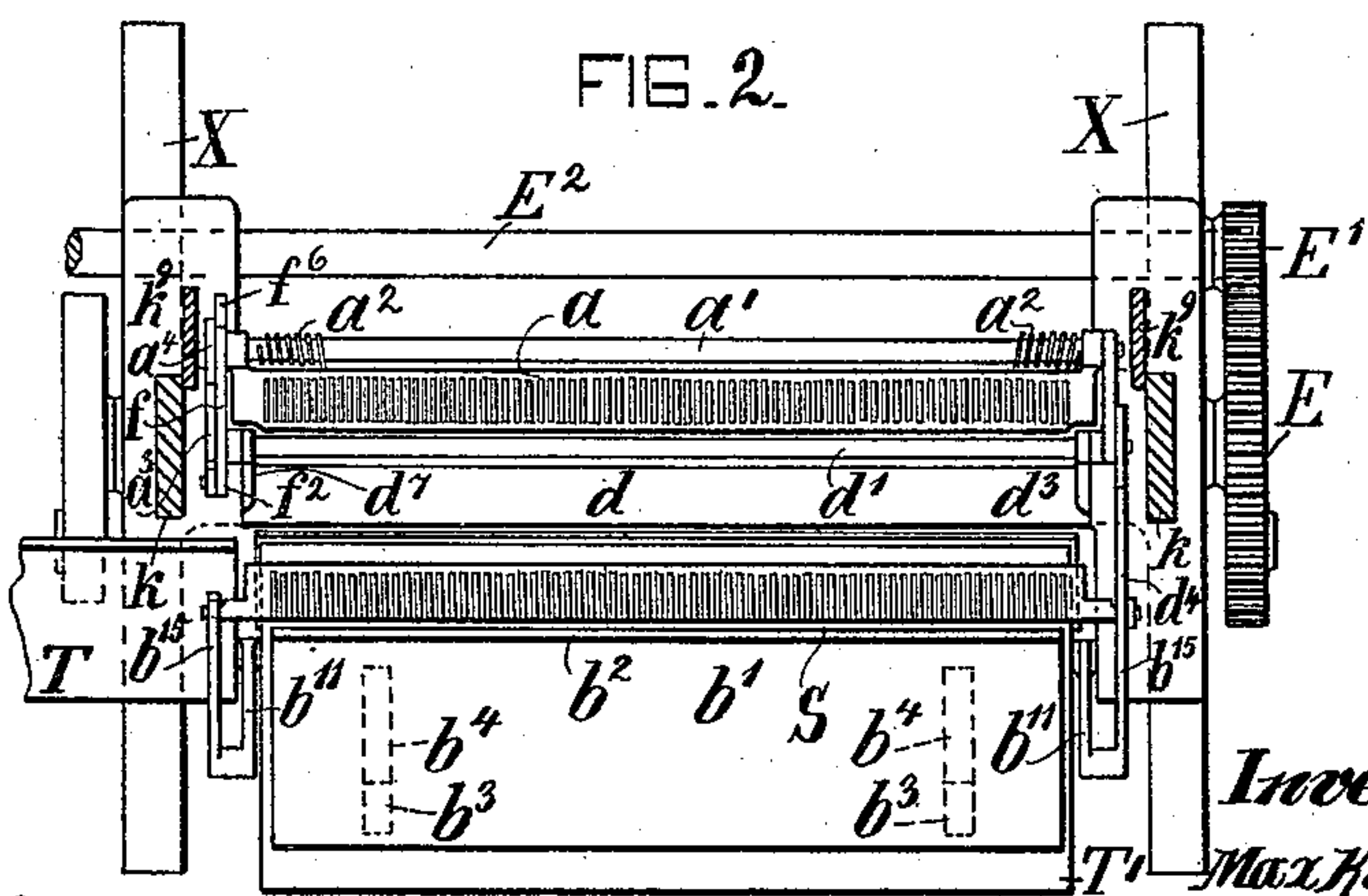
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5 Sheets—Sheet 2.

No. 495,095.

Patented Apr. 11, 1893.



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No. 495,095.

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FIG. 4.

FIG. 5.

FIG. 6.

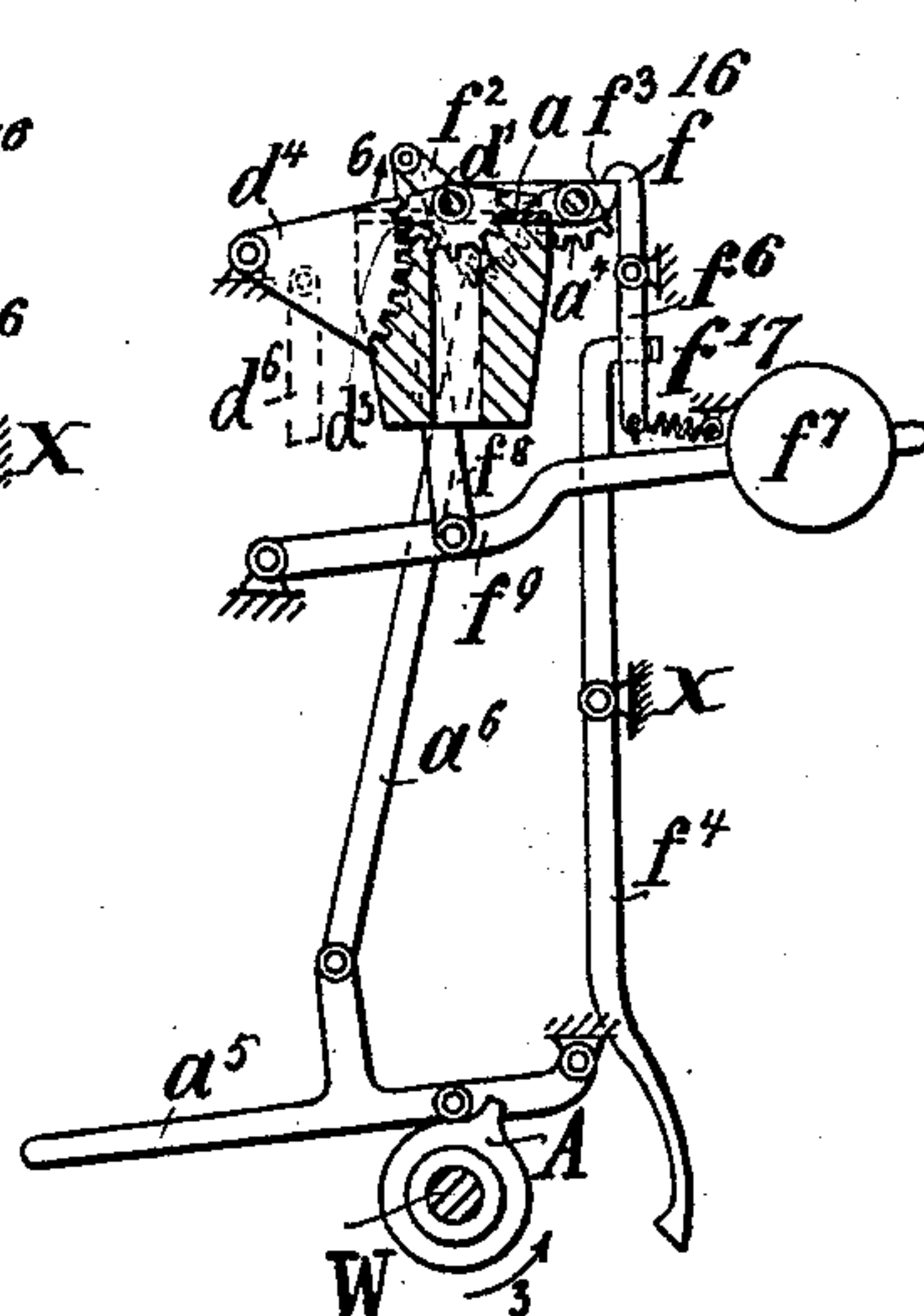
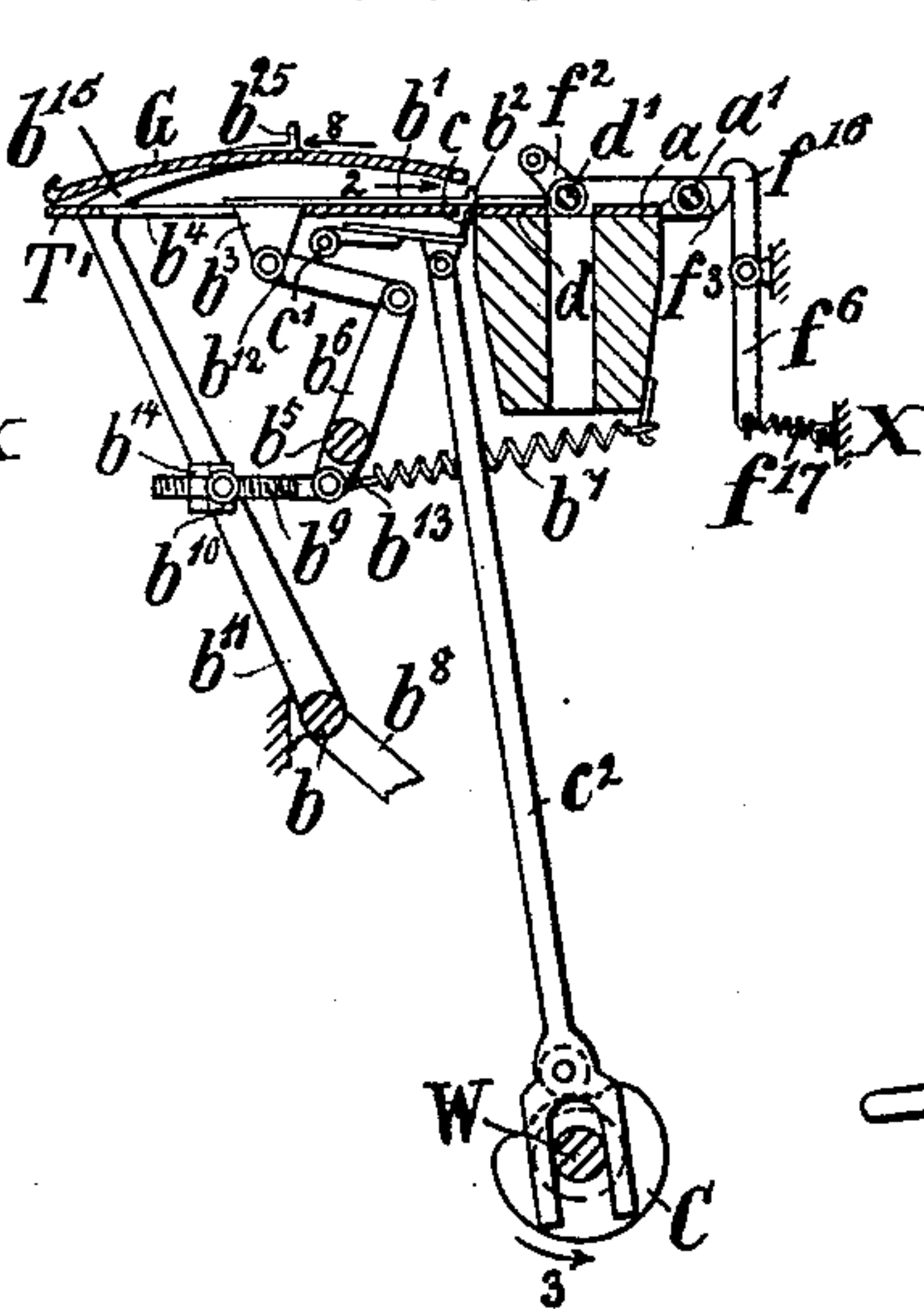
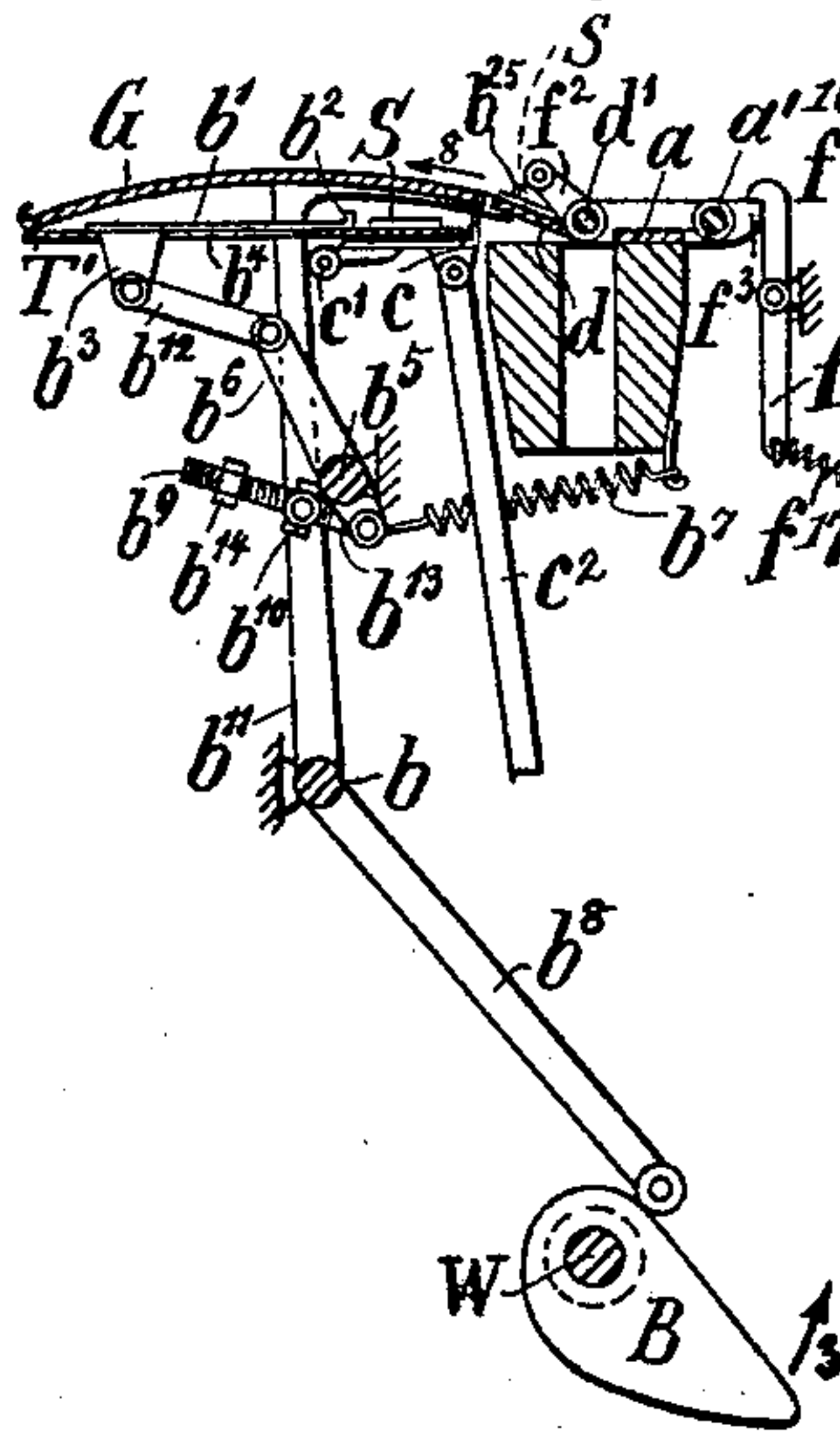


FIG. 7.

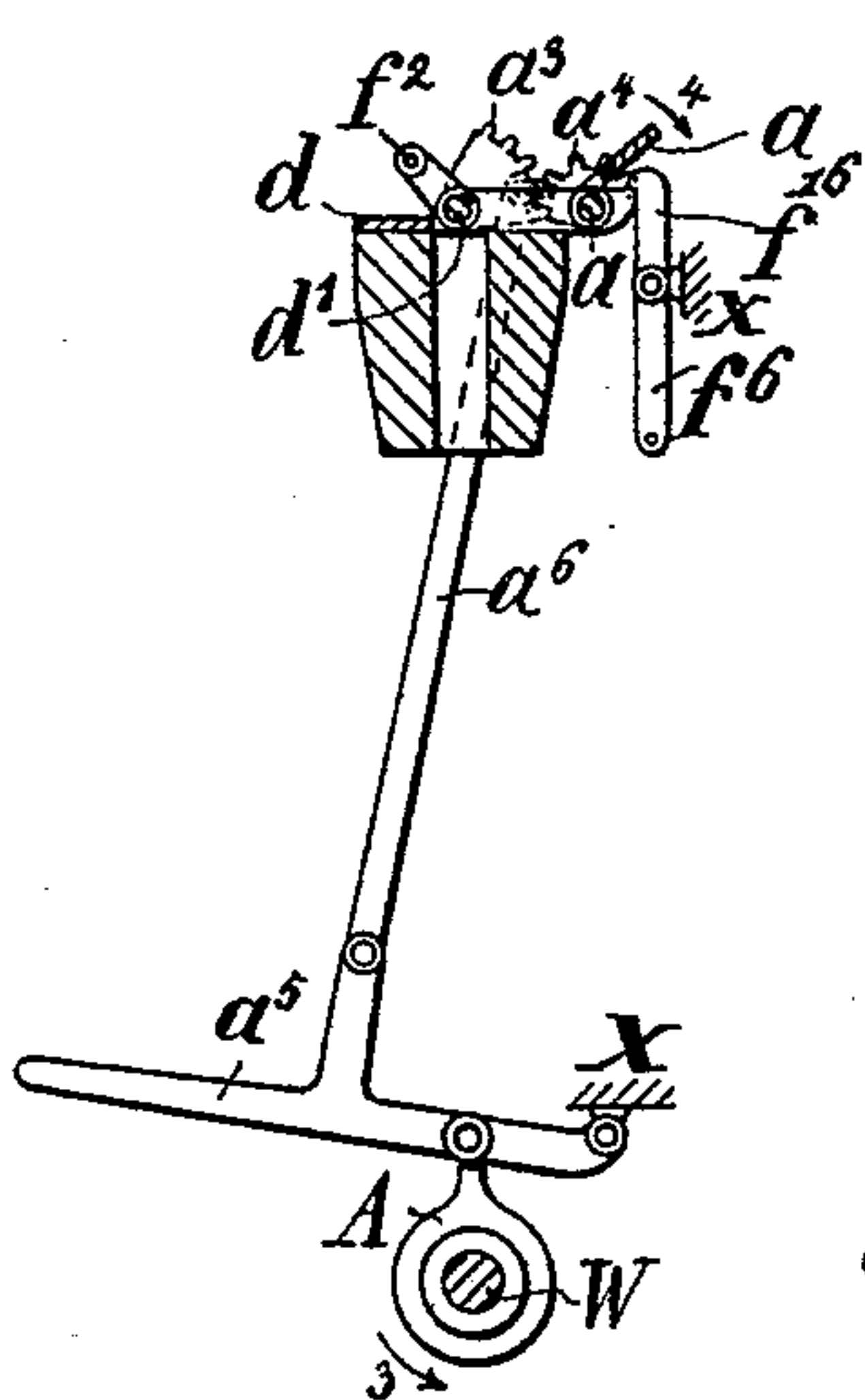


FIG. 8.

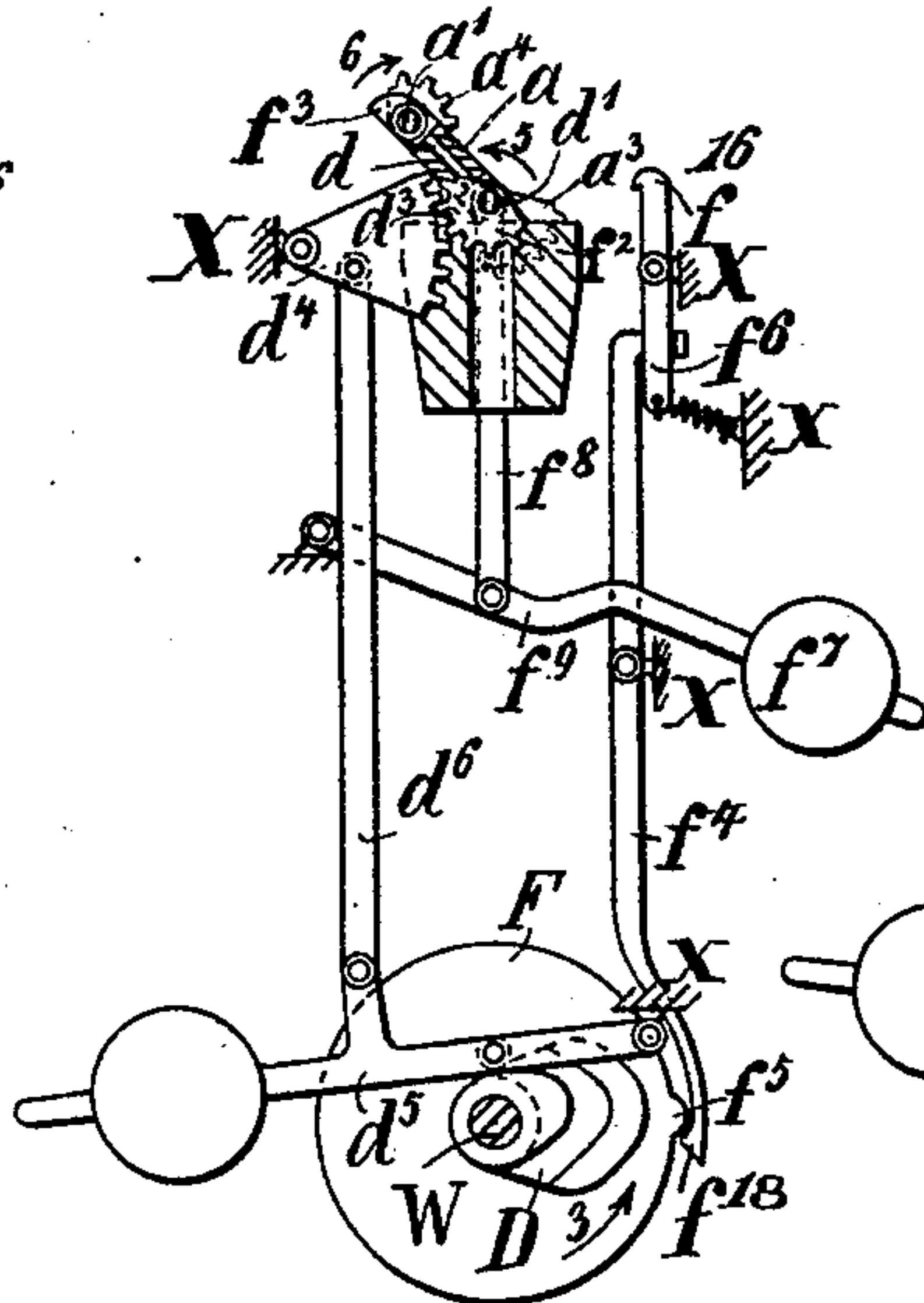
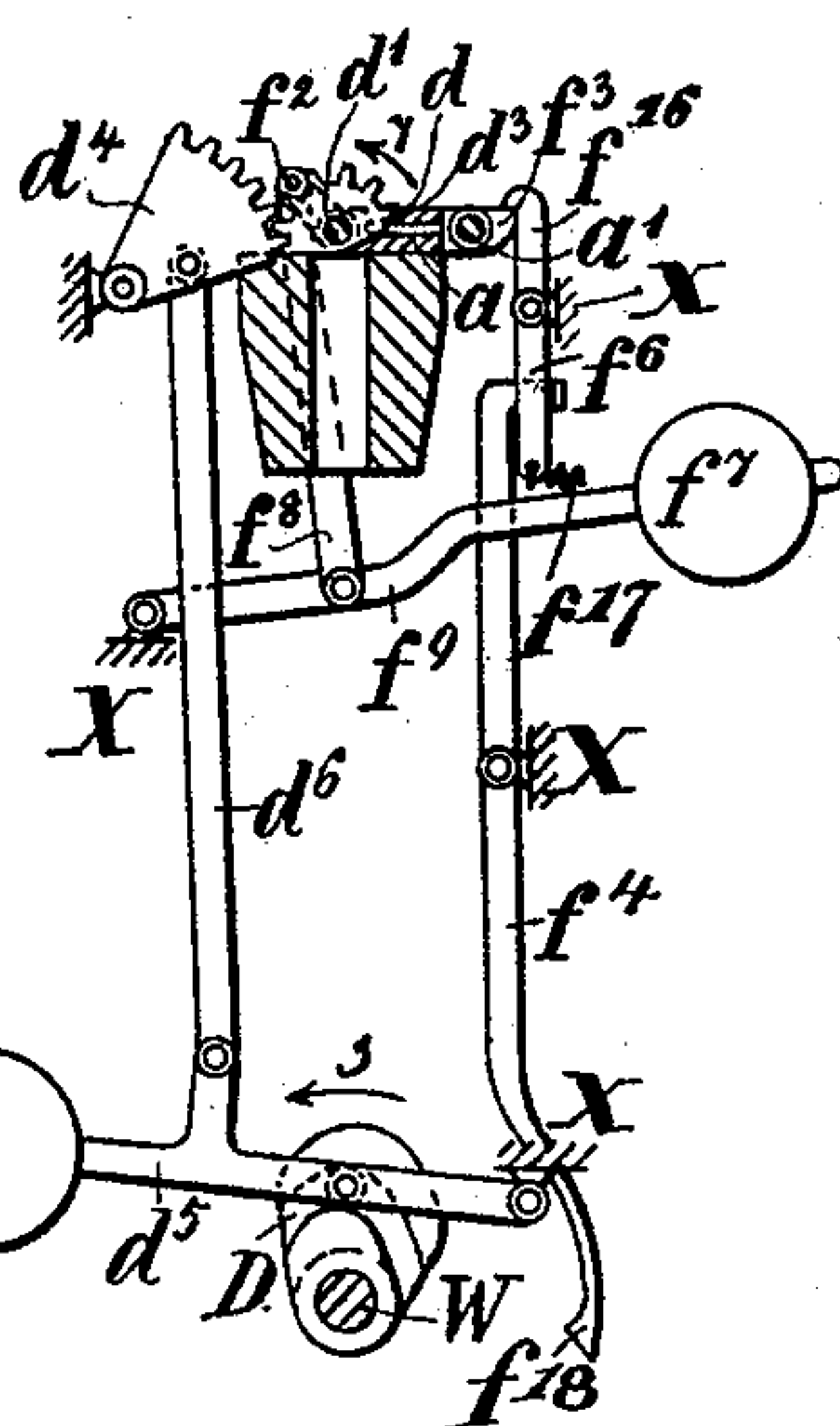


FIG. 9.



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(No Model.)

5 Sheets—Sheet 4.

M. KÜSTERMANN & H. GOTTSCHALK.  
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FIG. 10.

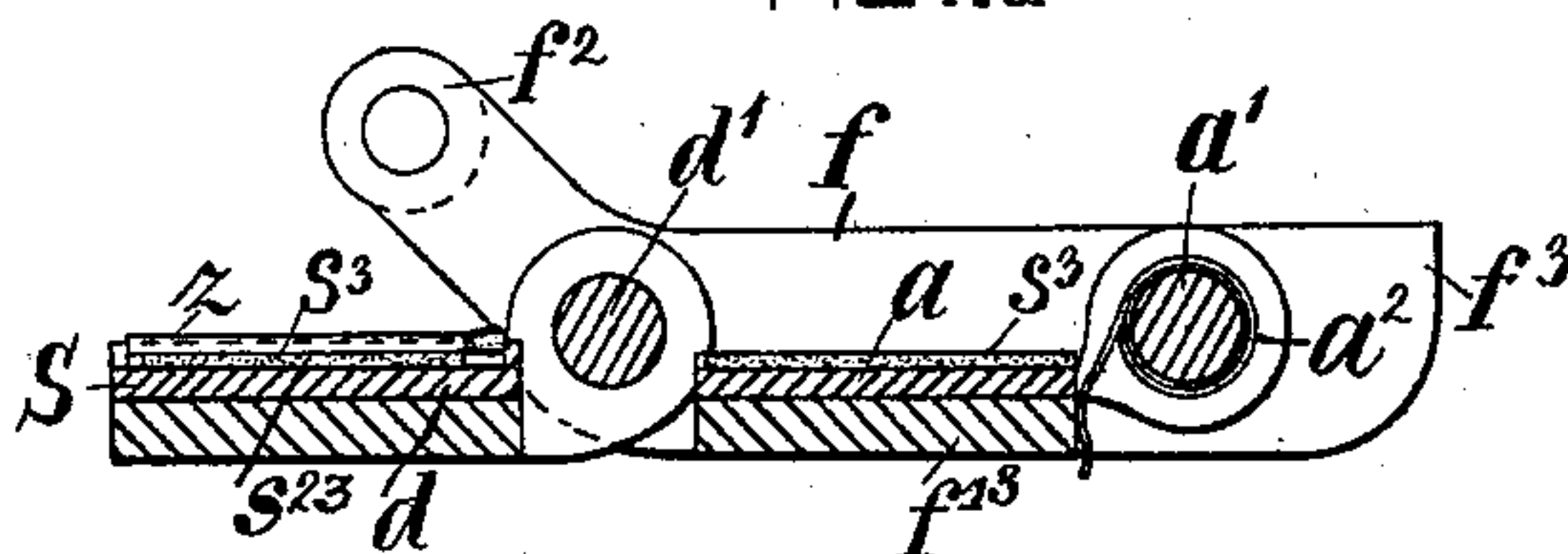


FIG. 11.

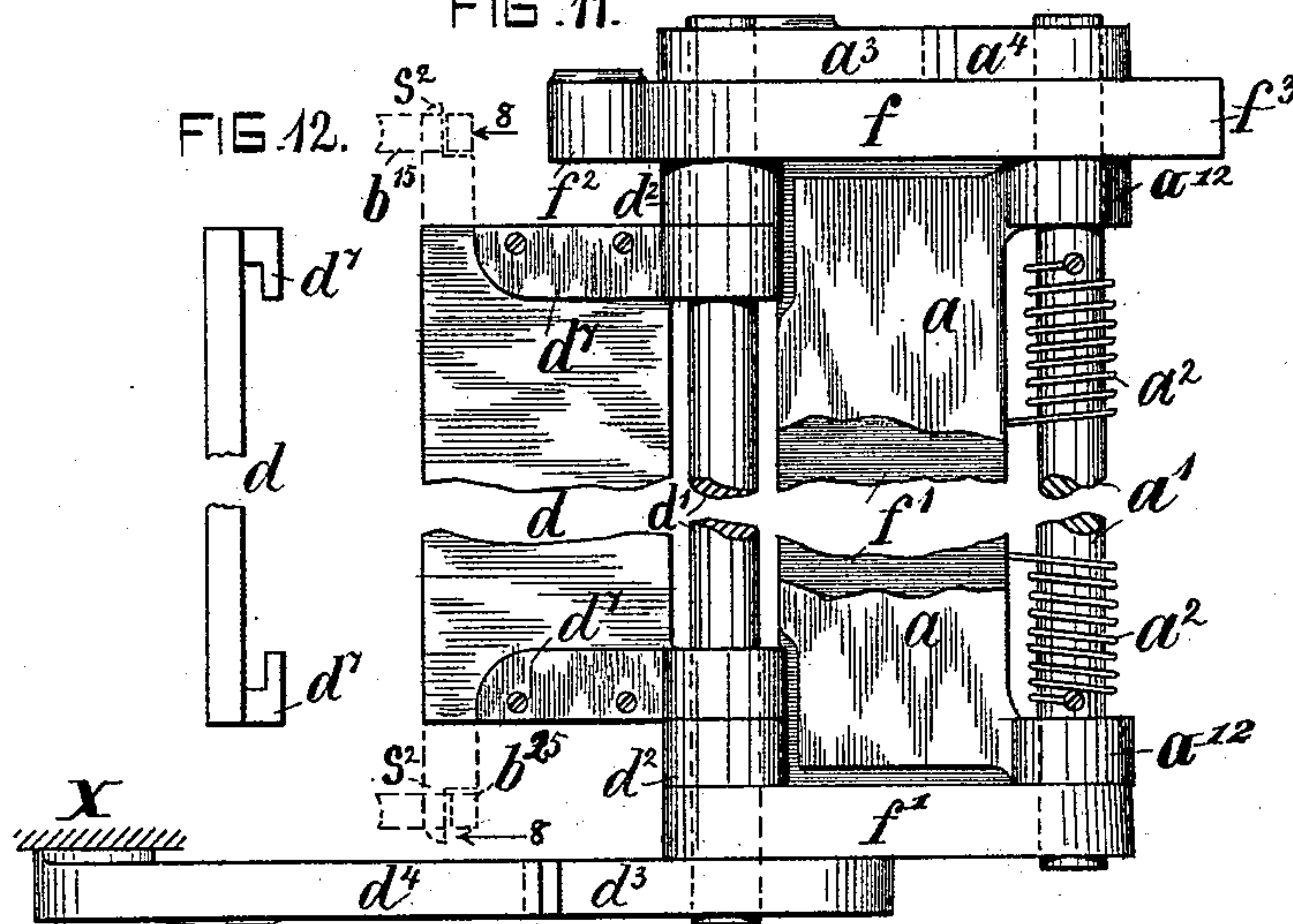
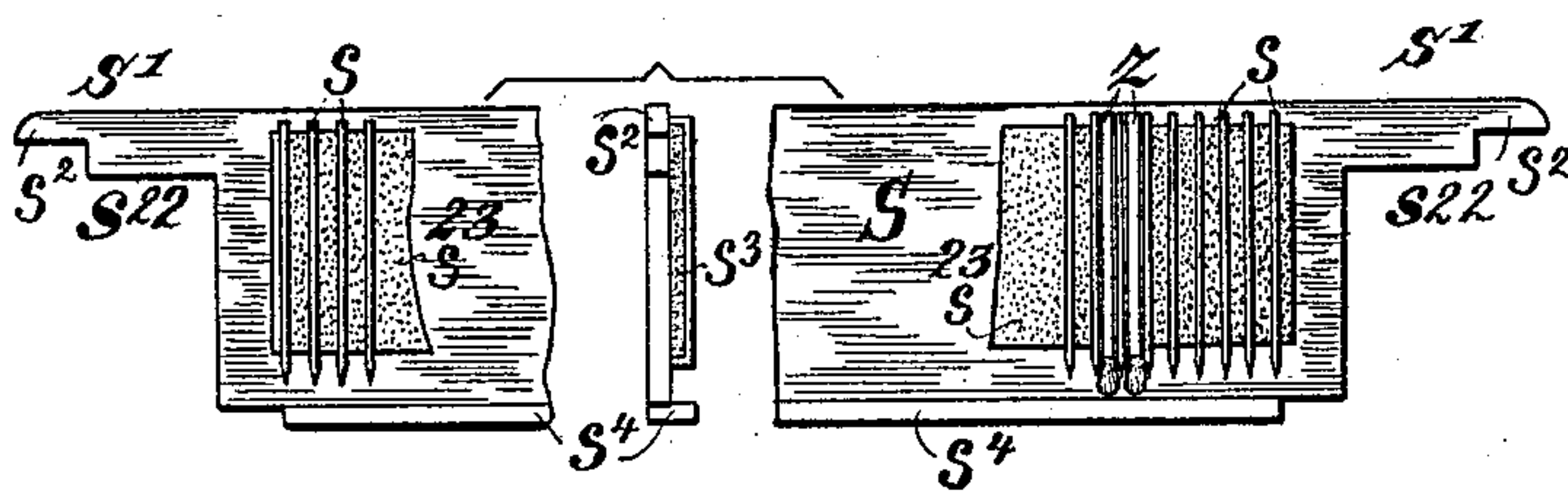


FIG. 13.



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(No Model.)

5 Sheets—Sheet 5.

M. KÜSTERMANN & H. GOTTSCHALK.

MACHINE FOR PRINTING ON MATCHES.

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FIG. 14.

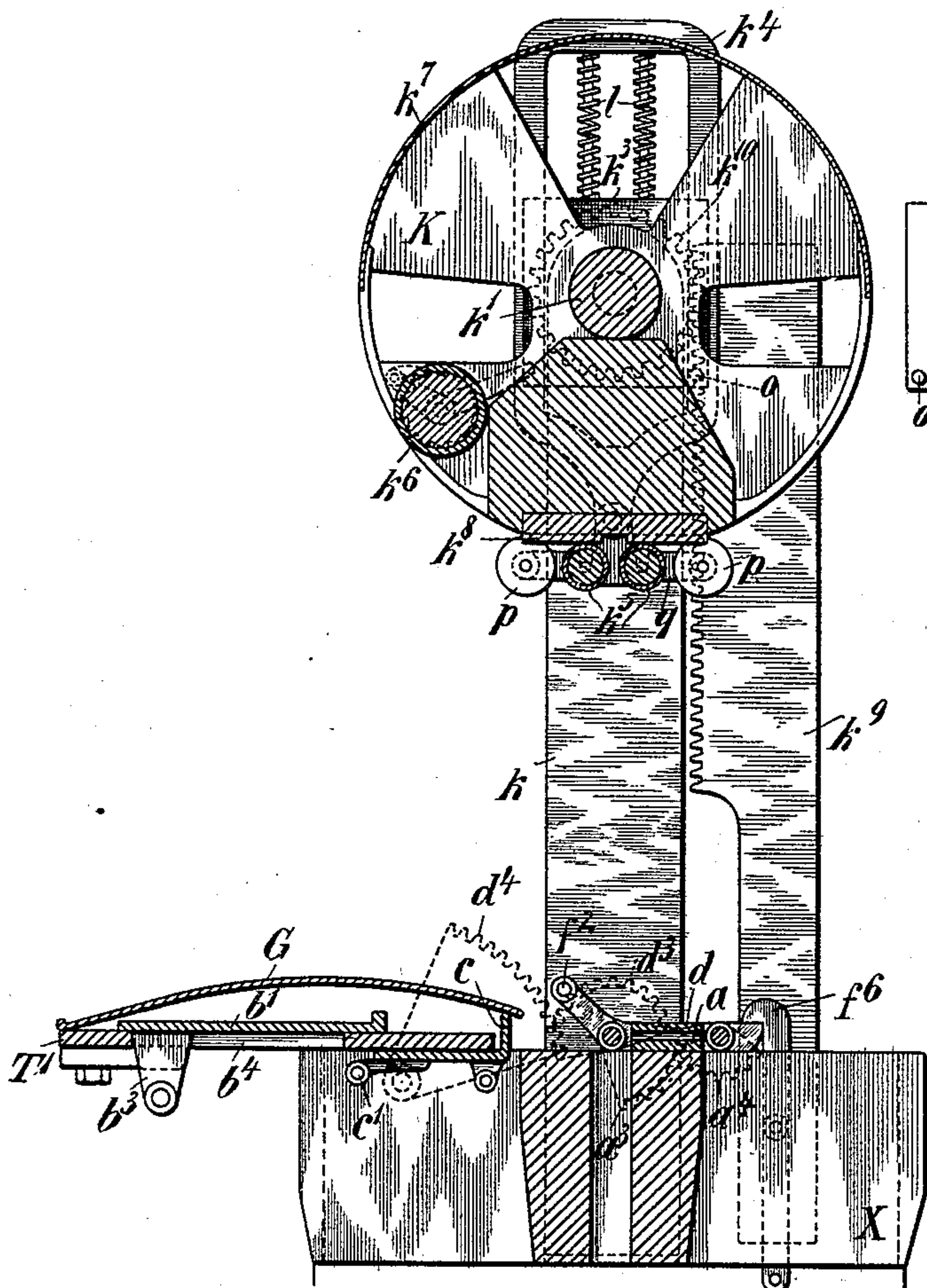
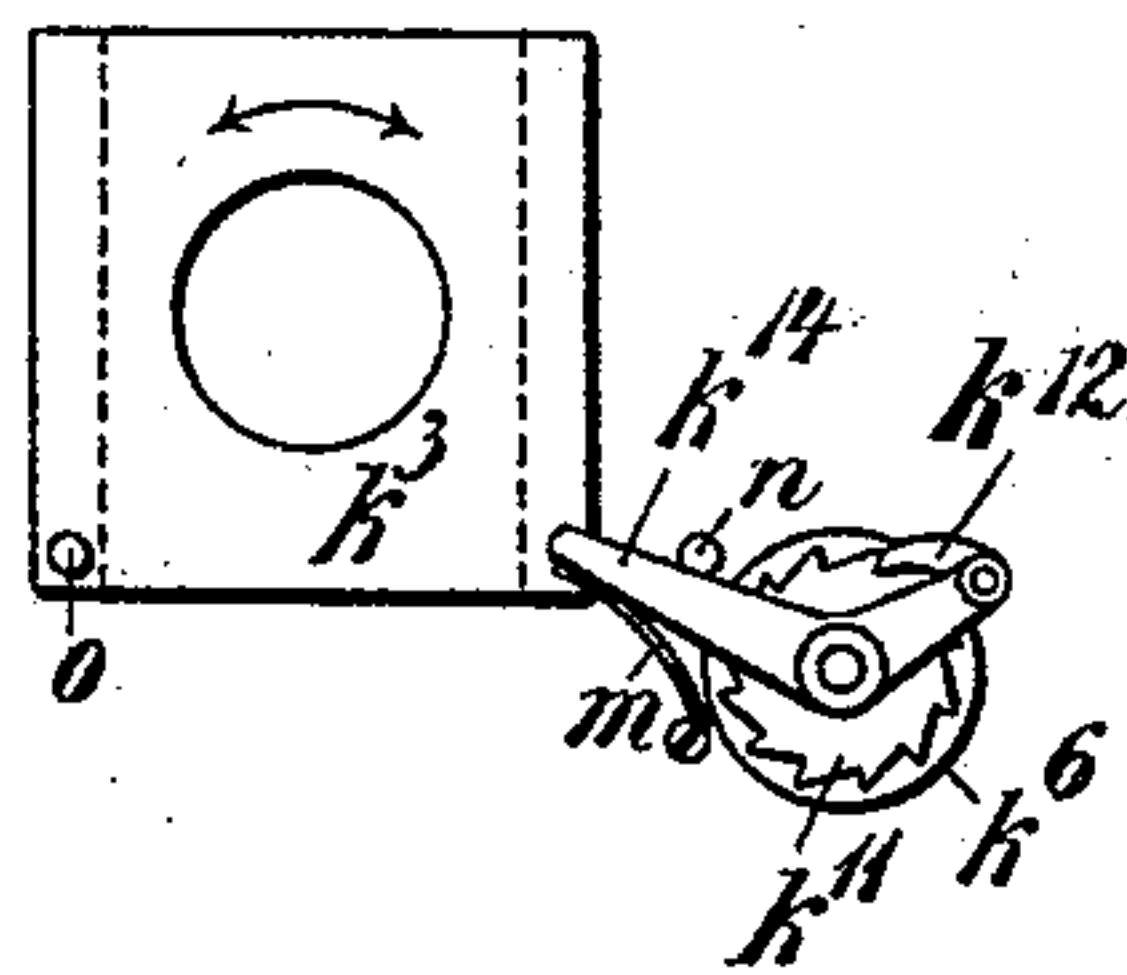


FIG. 15.



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# UNITED STATES PATENT OFFICE.

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TO THE VEREINIGTE ZÜNDWAARENFABRIKEN ACTIEN-GESELLSCHAFT  
ZANOW-HANNOVER, OF HANOVER, AND SIEGMUND BUD, OF BERLIN,  
GERMANY.

## MACHINE FOR PRINTING ON MATCHES.

SPECIFICATION forming part of Letters Patent No. 495,095, dated April 11, 1893.

Application filed June 1, 1892. Serial No. 435,199. (No model.) Patented in Belgium January 1, 1892, No. 97,997.

*To all whom it may concern:*

Be it known that we, MAX KÜSTERMANN, manufacturer, and HERMANN GOTTSCHALK, engineer, subjects of the King of Prussia, residing at Berlin, Prussia, Germany, have invented certain new and useful Improvements in and Relating to Machines for Printing on Matches, (for which Letters Patent have been obtained in Belgium, dated January 1, 1892, No. 97,997;) and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our invention has relation to printing machines, and more particularly to that class of machines designed for the printing of advertisements or other matter upon matches.

All machines of this class so far as they are known to us are defective in that there are no adequate means provided to properly feed the matches to the printing devices and hold the same in proper position relatively to said devices during the operation of printing, and that each match has to be fed separately to said devices.

The invention has for its object to remedy these disadvantages by the provision of means whereby a comparatively great number of matches are printed upon simultaneously, and whereby said matches are automatically fed to the printing devices and held in a fixed position relatively to said devices during the operation of printing, and automatically withdraws from the machine.

The invention has also for its object the provision of means whereby a number of matches may have matter printed on opposite sides or faces, and means for automatically ejecting the matches from the machine.

To these ends the invention consists in structural features, and in combinations of co-operative elements or mechanisms as will now be fully described, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional elevation, Fig. 2 an end view, and Fig. 3 a sectional top plan view of a machine for printing upon matches embodying our invention. Figs. 4, 5, 6, 7, 8, and 9, are sectional detail views illustrating the various positions of the operative devices or mechanisms. Fig. 10 is a sectional view of the two oscillating or rocking beds. Fig. 11 is a top plan view of Fig. 10 partly broken away. Fig. 12 is an end view of the left hand oscillating bed, and Fig. 13 shows the match holder in plan partly broken away, and by an end view. Fig. 14 is a sectional view of the upper part of the machine, and Fig. 15 is a detail view illustrating the means for imparting a step by step rotation to the ink feed roller.

Similar letters of reference indicate like parts wherever these may occur in the above-described figures of drawings.

The operating mechanisms are supported on a suitably constructed frame work, X, in which the main driving shaft, E<sup>2</sup>, has its bearings also, said shaft carrying at one end a belt pulley, R, and at the other a pinion, E', that is in gear with a pinion, E, on the driven shaft, W, hereinafter called the cam shaft, from which cam shaft motion is transmitted to all of the operative devices of the machine by means of the cams, A, B, C, D, and F, (Figs. 3 to 9 inclusive) secured to said shaft, W.

From the left side of the machine projects the operator's table, T, (Fig. 3,) that is on a level with a feed table, T', which latter is slotted longitudinally as shown at b<sup>4</sup>, Figs. 1, 4, and 5, for the passage of two lugs depending from the front end of a feed plate, b', the rear end of said plate being bent at right angles to form a vertical abutment, b<sup>2</sup>, Figs. 1, 2, 4 and 5. To each of the lugs, b<sup>3</sup>, is pivoted one end of a link, b<sup>12</sup>, the other end of which is pivoted to a radial or crank arm b<sup>6</sup>, secured to a rock shaft, b<sup>5</sup>, Figs. 1, 3, 4 and 5, said shaft having a second short radial arm or crank, b<sup>13</sup>, to which is secured one end of a spring, b<sup>7</sup>, whose other end is secured to a proximate part of the frame work, and to said short radial arm is pivoted



one end of rod,  $b^9$ , that passes through an opening formed centrally of a connecting rod,  $b^{10}$ , that connects the two arms,  $b^{11}$ , of an ejector or extractor, the rod,  $b^9$ , being screw-threaded and carrying a nut,  $b^{14}$ , by means of which the movement of the connecting rod independently of the movement of the rod,  $b^9$ , can be regulated, and the movement of the feed plate in one direction properly timed, said plate receiving motion in a reverse direction from the spring,  $b^7$ .

The extractor, which serves to withdraw the empty match holder from its bed, is composed of two angle levers, the horizontal arm,  $b^{15}$ , of which is curved to correspond with the convex discharge table, G, Figs. 1, 4 and 5, and said horizontal arms are arranged at opposite ends of the said convex or arched discharge table. The outer ends of the curved arms,  $b^{15}$ , of the extractor levers are bent upwardly to form a hook,  $b^{25}$ , adapted to engage lugs or ears projecting from the opposite ends of the match holder presently to be described, the vertical arms,  $b^{11}$  of said levers being connected together by the rod,  $b^{10}$ , above referred to, and their lower ends are secured to or form an integral part of a rock shaft,  $b$ , that has a radial arm,  $b^8$ , carrying at its outer end a pin or roller in contact with the cam, B, on cam shaft, W, see Figs. 1, 3 and 4.

Below the feed table, T', is pivoted a stop plate,  $c$ , whose outer end is bent upward and is adapted to pass between the rear end of said feed table and the front movable bed,  $d$ , of the machine and serves as an abutment for the match holder to insure its being properly positioned in rear of the feed plate,  $b'$ , to be fed thereby onto said bed, which, when in its normal position is level with the feed table, T'. To the stop plate,  $c$ , is pivoted one end of an actuating rod,  $c^2$ , whose other end is forked and straddles the shaft, W, to hold the same in proper position by the side of the cam, C, on said shaft, said cam impinging upon a roller mounted on the rod, and imparting to the stop plate the necessary movements to interpose the same between the feed table, T', and bed,  $d$ , when the feed plate,  $b'$ , is withdrawn, and to withdraw said stop plate when said feed plate is about to move rearwardly to carry the match holder onto said bed.

The forward bed,  $d$ , Fig. 11, has at each end a bearing by means of which it is secured to a rock shaft,  $d'$ , which passes loosely through bearings,  $d^2$ , Fig. 11, secured to the frame work, X, and said shaft carries at one end a toothed sector,  $a^3$ , loose on said shaft, and at the other end a like sector,  $d^3$ , keyed thereto. The sector,  $d^3$ , is in gear with a like sector,  $d^4$ , pivoted to the frame work, X, and to one end of a connecting rod,  $d^6$ , Fig. 8, whose other end is pivoted to a weighted lever,  $d^5$ , that is also pivoted to the frame work, X, see Figs. 3, 8 and 9. The weighted lever,  $d^5$ , is provided with a roller in contact with the cam, D, on cam shaft, W, which cam imparts the necessary

motion to the toothed sector,  $d^4$ , and through the latter to the toothed sector,  $d^3$ , to move the bed,  $d$ , from its normal position, Figs. 1, 5, 6 and 7, to the positions shown in Figs. 4, 8, and 9. The bed,  $d$ , is also provided at each end with an overhanging plate or bracket,  $d^7$ , Figs. 11 and 12, forming guide grooves for the reception of the match holder, whereby the latter is held in proper position relatively to the printing devices.

To the sector,  $a^3$ , on shaft,  $d'$ , is pivoted one end of a connecting rod,  $a^6$ , whose other end is pivoted to a lever,  $a^5$ , that has its fulcrum on the frame work, X; the lever carries a roller in contact with the cam, A, on cam shaft, W, which cam serves to impart a partial rotation to the sector through the lever and the described connections. Upon the shaft,  $d'$ , are also loosely mounted two levers,  $f$ , and  $f'$ , that have suitable bearings for a shaft,  $a'$ , Fig. 11. The lever,  $f$ , is extended beyond the shafts,  $d'$ ,  $a'$ , the forward extension or arm,  $f^2$ , having pivoted thereto one end of a connecting rod,  $f^8$ , whose other end is pivoted to a lever,  $f^9$ , that has its fulcrum on the frame work, X, and carries a weight,  $f^7$ , said weighted lever,  $f^9$ , serving to move the levers,  $f$ , and  $f'$ , from their normal position, Figs. 1, 4, 5, 6, 7, and 9, to the position shown in Fig. 8, whenever said levers are released, as will be presently described. The rear bed,  $a$ , is also provided with bearings,  $a^{12}$ , Fig. 11, through which the shaft,  $a'$ , passes, said bearings being keyed to said shaft. The bed,  $a$ , is held down to a rail  $f^{13}$ , by means of springs,  $a^2$ , mounted on shaft,  $a'$ , see Figs. 10 and 11, and said bed,  $a$ , is provided with an elastic blanket  $s^3$ , preferably of rubber, as shown in Fig. 10.

The levers,  $f$ , and  $f'$ , are held down in their normal position by means of a two-armed locking lever,  $f^6$ , that has its fulcrum on the framing, X, and whose nose,  $f^{16}$ , engages the rear extension,  $f^3$ , of lever,  $f$ , and is held in engagement therewith by a spring,  $f^{17}$ , secured to the lower end of said lever,  $f^6$ , and to the framing, X, respectively. The locking lever is periodically disengaged from lever,  $f$ , by a lever,  $f^4$ , Figs. 6, 8 and 9, fulcrumed to the framing, X, the upper or hooked end of the releasing lever acting upon said locking lever,  $f^6$ , and the lower end of said releasing lever is curved to conform to the curvature of the cam disk, F, on cam shaft, W, Figs. 3 and 8, the nose,  $f^5$ , of the cam disk periodically engaging a projection,  $f^{18}$ , at the lowermost end of the releasing lever,  $f^4$ .

As shown in Fig. 8, the cam disk, F, revolves in the direction of arrow, 3, and so long as the nose,  $f^3$ , of the cam is in contact with the curved portion of the releasing lever,  $f^4$ , the lower arm of said lever is held away from the cam, thereby drawing the lower arm of the locking lever,  $f^6$ , toward said cam against the stress of its spring,  $f^{17}$ , while the upper arm of the latter lever is held withdrawn from the lever,  $f$ . Of course, when the locking le-



ver engages the lever,  $f$ , the weighted lever cannot act to rotate the levers,  $f$ ,  $f'$ , and bed,  $a$ , but whenever said locking lever is released the weighted lever connected as described with the forward extension or arm,  $f^2$ , of lever,  $f$ , will draw the same down, thereby moving levers,  $f$ , and  $f'$ , and bed,  $a$ , from the position shown in Figs. 1, 4, 5, and 6, to the position shown in Fig. 8.

10 The printing devices consist of a type or form carrier  $K$  that is provided with plates or forms,  $k^8$ , having a number of lines of type corresponding to the number of matches contained in the match holder, one form for each of the beds,  $d$ , and  $a$ , as shown in Figs. 1 and 14.

As shown in Figs. 1, 3 and 14, the carrier,  $K$ , has the general form of a cylinder, with a flattened or segmented face for the reception of the forms or plates,  $k^8$ , the upper semi-cylindrical portion,  $k^7$ , serving the purposes of an ink distributing table, and is secured to a shaft,  $k'$ , that receives a vertical reciprocating motion through the medium of two connecting rods,  $F'$ , one at each end of said shaft, respectively connected to a crank or wrist pin on the cam disk,  $F$ , and through the pinion,  $E$ , on cam shaft,  $W$ , see Fig. 3. The shaft,  $k'$ , has its bearings,  $k^2$ , in suitable blocks adjustable on the upper end of the connecting rods,  $F'$ , whereby the pressure exerted by the type carrier can be regulated in a well known manner, and said shaft is guided in its movements in two vertically slotted standards  $k$ , whereby a perfectly steady motion is imparted thereto, and consequently to the type carrier. On the shaft  $k'$ , at each end of the type carrier,  $K$ , is loosely mounted a block,  $k^3$ , to which is fitted a slide  $k^4$ , and to the latter is pivotally connected a carrier,  $q$ , in which are mounted the inking in rollers,  $k^5$ . Each of the blocks has rigidly connected therewith, or may form an integral part of, a pinion  $k^{10}$ , said pinions gearing with rack bars,  $k^9$ , Figs. 1, 3, and 14, so that as the shaft,  $k'$ , and carrier  $K$  are reciprocated a partial rotation is imparted to said blocks,  $k^3$ , and their slides,  $k^4$ , and inking in rolls,  $k^5$ , in the direction of arrow 9 or 10 according to the direction of motion of said shaft,  $k'$ , and carrier,  $K$ . As shown in said Figs. 1, 3, and 14, the type carrier,  $K$ , also carries an ink feed roller,  $k^6$ , which delivers ink to the inking in rollers,  $k^5$ , the latter revolving in contact with the feed roller when the type carrier  $K$  is about to reach the limit of its downward motion. That is to say, the inking in rollers,  $k^5$ , receive ink from the feed roller,  $k^6$ , when an impression is being made. On the return movement of the carrier  $K$ , in the direction of arrow 10, Fig. 1, the inking in rollers,  $k^5$ , roll over the spreader or distributing convex surface  $k^7$ , whereby the ink is evenly distributed over said inking in rollers, and thence over the forms,  $k^8$ , to ink them in. As the carrier,  $K$ , descends, the inking in rollers are revolved in the direction of arrow 9, and receive ink from the feed roller

about the time the type carrier reaches the limit of its downward movement.

As shown in Figs. 1 and 14, the inking in rolls are held on the feed roll and distributing convex surface by a yielding pressure through the medium of springs,  $l$ , respectively connected with the slide,  $k^4$ , and blocks,  $k^3$ .

From what has been said it will be seen that the inking rollers,  $k^5$ , revolve in opposite directions on the shaft,  $k'$ , that when they revolve in the direction of the arrow, 9, Fig. 1, they take up ink from roller,  $k^6$ , and that when they move in the direction of arrow, 10, the ink is distributed evenly on the rollers as they roll over table,  $k^7$ , and then ink in both plates or forms,  $k^8$ , after which they again revolve in the direction of arrow, 9.

In order that the inking in rollers,  $k^5$ , may contact with the feed roller,  $k^6$ , at a different point at each downward movement of the type carrier,  $K$ , we provide suitable mechanism for imparting a step by step rotation to said feed roller, which mechanism consists of a ratchet wheel,  $k^{11}$ , Figs. 1, 3, and 15, rigidly secured to the roller journal, a pawl,  $k^{12}$ , engaging said ratchet, said pawl being pivoted to one arm of a bell crank lever,  $k^{14}$ , loose on said roller journal, the other arm of said lever lying in the path of a pin,  $o$ , on one of the blocks,  $k^3$ , so that whenever the type carrier moves downwardly to make an impression, the blocks,  $k^3$  are so positioned that the pin,  $o$ , on one of them engages the lever arm whereby the feed roller,  $k^6$ , is partially revolved, the pawl being returned to its normal position against a pin  $n$  by a suitable spring,  $m$ , shown in dotted lines in Fig. 1, and in full lines in Fig. 15. Or, in other words, as the type carrier descends, and before the inking in rollers reach the feed roller, the pin depresses the arm of the bell crank lever against the stress of the spring,  $m$ , causing the pawl to impart to the ratchet,  $k^{11}$ , and feed roller,  $k^6$ , a partial rotation, and when said pin has released the pawl arm the spring returns the same into its normal position, during which movement the pawl rides idly over the teeth of the ratchet.

The holder for the matches, Fig. 13, consists of a plate,  $S$ , provided at its front end with lateral projections,  $S'$ , that form bearings,  $s^2$ , and  $s^{22}$ , which latter when the holder is pushed onto the bed,  $d$ , with its edges under the overhanging brackets,  $d^7$ , abut against said brackets to limit the movement of the holder and to position the same correctly relatively to the type carrier and the forward sets of type,  $k^8$ . The bearings,  $s^2$ , when the match holder is in position on the bed abut against the hook ends,  $b^{25}$ , of the extractor arms,  $b^{15}$ , for the purpose of withdrawing or extracting the match holder after the matches have received an impression upon one side, or after said matches have been transferred to the bed to receive an impression upon the opposite side. The match holder,  $S$ , is provided with a yielding or elastic blanket,  $s^{23}$ ,



that is divided by means of partitions such as wires, *s*, into a number of compartments of the requisite size for the reception of the matches *z*, one match for each compartment (Fig. 13) in which the said matches are held against lateral movement, and said holder has along its rear edge a vertical projection, *s*<sup>4</sup>, that serves as an abutment for the match heads and insures their correct position.

Of course if the matches are to be printed upon one side only, the machine can be very much simplified, the bed, *d*, need then have but a very limited oscillating movement, while the bed, *a*, and the mechanisms that impart motion thereto, as well as the levers, *f* and *f'*, would be dispensed with.

The operation of printing matches upon both sides will now be described, and from this description the operation of printing matches upon one side only will be readily understood. It will also be understood that the cam shaft, *W*, is continuously revolved, and that the cams, *A*, *B*, *C*, *D*, and *F*, are so mounted or disposed on the shaft, that their function is properly timed to set in motion the elements actuated thereby in the order in which they operate.

The operator has his station by the table, *T*, on the left of the machine, and supposing the operative devices to be in the position shown in Fig. 1, and a match holder, *S*, supplied with matches, to be ready for introduction under the concave discharge table, *G*, and the cam shaft, *W*, set in motion, the cam, *C*, will first lift the stop plate, *c*, into the position Fig. 4. The match holder is now pushed by the operation in the direction of arrow, Fig. 3, from the table, *T*, onto the table, *T'*, under the discharge table, *G*, so as to lie between the upturned end *b*<sup>2</sup>, of the feed plate, *b'*, and the like end of the stop plate, *c*. The cam, *B*, revolving in the direction of arrow, 3, Fig. 4, now acts upon the connecting rod, *b*<sup>8</sup> and simultaneously therewith the stop plate, *c*, again moves down so as to withdraw the upturned end thereof from the path of the match holder. The action of the cam, *B*, and rod, *b*<sup>8</sup>, rocks the shaft, *b*, and moves the extractor, *b*<sup>15</sup>, from the position Fig. 4, to the position Figs. 1 and 5, and inasmuch as the shaft, *b*<sup>5</sup>, is connected through the screw rod, *b*<sup>9</sup>, and nut, *b*<sup>14</sup>, with the rod, *b*<sup>10</sup>, that connects the arms, *b*<sup>11</sup> of the extractor, said shaft, *b*<sup>5</sup>, is rocked also, whereby the feed plate, *b'*, is moved in the direction of arrow, 2, from its position Fig. 4, to the position shown in Fig. 5, carrying along the match holder and pushing the same onto the bed, *d*, under the overhanging brackets, *d*<sup>7</sup>, the bearings, *s*<sup>22</sup> abutting against the forward edges of said brackets, while the lugs or bearings *s*<sup>2</sup> project beyond said brackets, as hereinbefore explained. As soon as the match holder, *S*, reaches its position on the bed, *d*, the type carrier descends, its forward sets of type making an impression on the matches in the holder, *S*, the inking rollers, *k*<sup>5</sup>, being at the same time brought in

contact with the ink roller, *k*<sup>6</sup>, to which a partial rotation has been imparted by the ratchet and pawl mechanism through the medium of the pin on the block, *k*<sup>3</sup>, that serves to revolve the inking roller carrier, *k*<sup>4</sup>, as above described. The type carrier again ascends, the inking rollers being revolved in an opposite direction, rolling over the semi-cylindrical ink table, *k*<sup>7</sup>, whereby the ink is properly distributed, and as the type carrier is about to reach the limit of its upward motion the ink rollers pass over the two plates or forms, *k*<sup>8</sup>, and ink them in. As the type carrier moves away from the beds, *d*, and *a*, the matches printed upon one side are transferred to the bed, *a*, so as to present the opposite unprinted side to the rear sets of type, *k*<sup>8</sup>, of the type carrier the cam, *A*, acts on the lever, *a*<sup>5</sup>, in such a manner as to move the connecting rod, *a*<sup>6</sup>, rapidly upward to revolve the sector, *a*<sup>3</sup>, thereby revolving the sector, *a*<sup>4</sup>, on the shaft, *a*<sup>1</sup>, of the bed, *a*, together with said bed against the stress of the springs, *a*<sup>2</sup>, in the direction of arrow, 4, Fig. 7, which movement of the bed serves to throw the matches, after having been transferred thereto and printed, out of the machine, as will presently be seen, the bed, *a*, returning immediately into its normal position under the stress of said springs, *a*<sup>2</sup>, on shaft, *a*<sup>1</sup>. The nose, *f*<sup>5</sup>, of disk, *F*, now acts upon the lever, *f*<sup>4</sup>, so as to move the locking lever, *f*<sup>6</sup>, out of engagement with the lever, *f*, thus permitting the lever, *f*<sup>9</sup>, under its weight to move down from the position Figs. 6 and 9, into the position Fig. 8, whereby the levers, *f*, and *f'*, and the bed, *a*, are tilted in the direction of arrow, 5, into the position shown in said Fig. 8. As the bed, *a*, moves into the described position the cam *D*, acts on the weighted lever, *d*<sup>5</sup>, lifting the same and revolving the sector, *d*<sup>4</sup>, in the direction of arrow, 6, Fig. 6, and as said sector is in gear with the sector, *d*<sup>3</sup>, the latter is revolved in a like direction, and with it the bed, *d*, and match holder, *S*, whereby the latter is brought in contact with the bed, *a*, as shown in Fig. 8, the rubber blanket, *s*<sup>3</sup>, of bed, *a*, being firmly pressed onto the match holder, *S*, and onto the printed side of the matches. As the sectors, *d*<sup>3</sup>, *d*<sup>4</sup>, continue their rotation in the direction referred to, both beds, *d*, and *a*, and the levers, *f*, and *f'*, are turned over into the position shown in Fig. 9, said bed, *a*, and levers, *f*, and *f'*, having now been returned to their normal position, the matches in holder *S*, lying on the blanket, *s*<sup>3</sup>, of bed, *a*, with their unprinted side uppermost. In this movement of the bed, *a*, and levers, *f*, and *f'*, the weighted lever, *f*<sup>9</sup>, is lifted again, and as soon as said parts have assumed the described position, the nose, *f*<sup>5</sup>, of the cam disk, *F*, will have moved out of contact with the lever, *f*<sup>4</sup>, so that the locking lever, *f*<sup>6</sup>, under the stress of its spring, *f*<sup>17</sup>, will again engage the projection, *f*<sup>3</sup>, of lever, *f'*, and lock the same against motion under the weight, *f*<sup>7</sup>, on lever, *f*<sup>9</sup>. The two beds, *d*, and *a*, are



brought into contact with sufficient force to properly position the matches on the blanket  $s^3$ , of bed,  $a$ , under the rearward form or plate,  $k^8$ , of the type-carrier ready to be printed upon. As soon as the described movements of the beds have taken place and the bed,  $a$ , locked against movement, the cam, D, revolving in the direction of arrow, 3, Figs. 8 and 9, will be in such a position as to allow the weight on lever,  $d^5$ , to pull the latter downward and with it the sector,  $d^3$ , thereby revolving the sector,  $d^4$ , and bed,  $d$ , and match holder, S, again in the direction of arrow, 7, Fig. 9, leaving the matches on the blanket of bed,  $a$ . Before the second impression upon the matches takes place the match holder, S, is extracted, and a holder supplied with fresh matches introduced under the discharge table, G, as above described. In order that the empty match holder, S, may be removed from the table,  $d$ , the cam, D, is so constructed that the downward movement of the lever,  $d^6$ , and sector,  $d^4$ , is only a partial one, so as to carry the bed,  $d$ , into the position Fig. 4, with its upper face about flush with the like face of the discharge table, G. During the described movements of the beds,  $d$ , and  $a$ , the extractor has been moved from the position Fig. 5, into position shown in said Fig. 4, so that as the bed,  $d$ , descends into the position shown in the latter figure, the projections or bearings,  $s^2$ , on the match holder will be in front of the upturned end,  $b^{25}$ , of the extractor arms,  $b^{15}$ . The cam, D, again acts on the arm,  $b^8$ , to rock the shaft  $b$ , and therethrough the extractor arms,  $b^{11}$ , forwardly or in the direction of arrow, 3, Fig. 1, whereby the empty match holder is drawn from table,  $d$ , onto the discharge table, G, as shown in said Fig. 1. As soon as the empty match holder has left the bed,  $d$ , the latter completes its downward movement and is returned into its normal position, Fig. 1. The connection between the rock shafts,  $b^5$ , and  $b$ , is such that when said parts are in the position shown in Fig. 4, that is to say, when the extractor is about to withdraw the empty match holder, the said extractor will move in the direction of arrow, 8, Fig. 3, for a certain distance before the connecting rod  $b^{10}$ , engages the nut or adjustable abutment,  $b^{14}$ , on the screw rod,  $b^9$ , to admit of the withdrawal of the empty match holder and the introduction under the discharge table, G, of a holder supplied with fresh matches, before the feed plate,  $b'$ , is moved rearwardly to push the latter holder onto the bed  $d$ . During the aforesaid movements the stop plate,  $c$ , has also been moved upwardly into the position Fig. 4, and as the feed plate is about to move rearwardly said stop plate is again withdrawn, as hereinbefore described. As soon as the match holder, S, supplied with unprinted matches has been fed to bed,  $d$ , the type carrier again descends to make an impression thereon, as well as upon the unprinted side of the matches on table,  $a$ , the inking devices moving as herein-

before described to take fresh ink from roller,  $k^6$ . As the type carrier moves upwardly again, the two plates or forms,  $k^8$ , are inked in as set forth, and the cam, A, acts upon lever  $a^5$ , and through the latter and the connected rod  $a^4$ , upon the sector,  $a^3$ , to rapidly move the bed,  $a$ , in the direction of arrow, 4, and the position shown in Fig. 7, to throw the matches having imprints on opposite sides from the said bed out of the machine, as hereinbefore referred to. The bed,  $a$ , under the stress of the spring,  $a^2$ , on rock shaft,  $a'$ , is immediately returned into its normal position, after which the locking lever,  $f^6$ , is disengaged from lever,  $f'$ , through cam nose,  $f^5$ , and lever,  $f^4$ , and the described operations are repeated.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. In a machine for printing matches, the combination with the bed and a match holder divided into compartments, each adapted to receive a single match, of a type carrier adapted to reciprocate vertically to and from the bed, provided with sets of type corresponding in number to that of the compartments of the match holder, whereby an impression may be made upon all the matches in said holder simultaneously, substantially as set forth.

2. In a machine for printing matches, the combination with the bed and a match holder divided into compartments, each adapted to receive a single match, of a feeding device for feeding the holder to the bed, a type carrier arranged above the bed and provided with sets of type corresponding in number to that of the compartments of the holder, and mechanism substantially such as described adapted to impart a vertical reciprocating movement to the type carrier and a horizontal reciprocating movement to the feeding device, substantially as and for the purpose set forth.

3. In a machine for printing matches, the combination with the bed and a match holder divided into compartments, each adapted to receive a single match, of a feeding device for feeding the holder to the bed, a type carrier arranged above the bed and provided with sets of type corresponding in number to that of the compartments of the holder, an extractor for removing the holder from the bed, and mechanism substantially such as described adapted to impart a vertical reciprocating movement to the type carrier and a horizontal reciprocating movement in opposite directions to the feeding and extracting devices, substantially as and for the purpose set forth.

4. In a machine for printing matches, the combination with a rocking bed, a feed table on a level therewith, a convex discharge table above the feed table, and a match holder divided into compartments each adapted to receive a single match, of a feeding device for feeding the match holder from the feed



table to the bed, a type carrier arranged above the bed and provided with sets of type corresponding in number to that of the compartments of the match holder, an extractor lever for removing the holder from the bed, and mechanism substantially such as set forth adapted to impart a vertical reciprocating motion to the type carrier, a horizontal reciprocating motion in opposite directions to the feeding and extracting devices, and a partial rotation to the bed to bring the edge thereof on a level with the discharge table, said devices being timed in their movements substantially as described, for the purposes specified.

5. In a machine for printing matches, the combination with the bed and a match holder, of a feed table, a discharge table above the feed table, reciprocally movable feeding and extracting devices operating to move the holder from the feed table to the bed and from the latter to the discharge table, and printing devices for printing the matches in the holder, substantially as set forth.

6. In a machine for printing matches, the combination with the bed and a match holder, of a feed table, a concavo-convex discharge table, covering said feed table, reciprocally movable feed and extractor levers operating to move the holder from the feed table to the bed, and from the latter onto the discharge table, respectively, and printing devices for printing upon the matches, substantially as set forth.

7. In a machine of the class described, a type carrier, a substantially semi-cylindrical ink distributing table secured thereto, and a to-and-fro movable shaft on which the carrier is rigidly mounted, in combination with inking in rolls revoluble about the type carrier and ink distributing table, a slide with which said rolls are connected, a guide block for the slide, said block loose on the type carrier shaft, and a rack and pinion gear for revolving said block on the shaft, for the purpose set forth.

8. In a machine of the class described, a type carrier, a substantially semi-cylindrical ink distributing table secured thereto, and a to-and-fro movable shaft on which the carrier is rigidly mounted, in combination with inking in rolls revoluble about the type carrier and ink distributing table, a slide with which said rolls are connected, a guide block for the slide, said block loose on the type carrier shaft, a spring or springs connecting the slide with the block, and a rack and pinion gear for revolving said block on the shaft, for the purpose set forth.

9. In a machine of the class described, a type carrier, a substantially semi-cylindrical ink distributing table secured thereto, an ink distributing roll mounted within the carrier with its periphery in the plane of that of the ink distributing table, and a to-and-fro movable shaft on which the carrier is rigidly mounted, in combination with inking in rolls

revoluble about the type carrier and ink distributing table, a slide with which said rolls are connected, a guide block for the slide said block loose on the type carrier shaft, and a rack and pinion gear for revolving said block on the shaft, for the purpose set forth.

10. In a machine of the class described, a type carrier, a substantially semi-cylindrical ink distributing table secured thereto, an ink feeding roll mounted within the carrier with its periphery in the plane of that of the ink distributing table, a ratchet rigidly and a pawl lever loosely mounted on the roller journal and a to-and-fro movable shaft on which the carrier is secured, in combination with inking in rolls revoluble about the type carrier, ink table, and ink-feeding roll, a slide, a guide block therefor, said block loose on the type carrier shaft, a rack and pinion gear for revolving the block and slide, said block operating the pawl lever to impart a step by step movement to the ink feeding roll, for the purpose set forth.

11. In a machine for printing matches, the combination with the two beds lying normally in the same horizontal plane one in front of the other, a match holder divided into compartments, each adapted to contain a single match, and a locking device for locking the holder to the front bed, of mechanism substantially such as described operating to first move both the beds toward and in contact with each other, then together until the rear bed has returned into its normal position, and finally to move the front bed with the holder back into its normal position, whereby the matches in the holder are transferred from one bed to the other and their position reversed, substantially as and for the purpose set forth.

12. In a machine for printing matches, the combination with two beds lying normally in the same horizontal plane one in front of the other, a match holder divided into compartments each adapted to contain a single match, a locking device for locking the holder to the front bed and mechanism substantially such as described operating to first move both the beds toward and in contact with each other, then together until the rear bed has returned into its normal position, and finally to move the front bed with the holder back into its normal position, whereby the matches in the holder are transferred from one bed to the other and their position reversed, of a locking lever adapted to lock the rear bed against motion, a releasing lever for operating the locking lever, mechanisms such as the cam disk, F, for actuating said releasing lever, whereby the locking lever is periodically operated to release the said rear bed, and a spring connected with said locking lever operating to return the same to its normal position, substantially as and for the purpose set forth.

13. In a machine for printing matches, the combination with two beds lying normally in the same horizontal plane one in front of the



other, a match holder divided into compartments each adapted to contain a single match, a locking device for locking the holder to the front bed, and mechanism substantially such as described operating to first move both the beds toward and in contact with each other, then together until the rear bed has returned into its normal position, and finally to move the front bed with the holder back into its normal position, whereby the matches in the holder are transferred from one bed to the other and their position reversed, of a type carrier arranged above the beds carrying two forms or plates each provided with sets of type corresponding in number to that of the compartments in the match holder, and mechanism substantially such as described operating to impart a vertical reciprocating motion to the type carrier, substantially as and for the purpose set forth.

14. In a machine for printing matches, the combination with two beds lying normally in the same horizontal plane one in front of the other, means for transferring the matches from the front to the rear bed, and mechanism substantially such as described and operating to tilt the rear bed rearwardly for the purpose of discharging the matches therefrom, substantially as set forth.

15. In a machine for printing matches, the combination with a pivoted bed lying normally in a horizontal plane, a feed table in the same plane, and a convex discharge table overhanging the feed table, a match holder, a feeding device adapted to feed the holder from the feed table onto the bed, and an extractor adapted to engage the match holder and withdraw the same from the bed, of mechanism substantially such as described for tilting the bed upwardly with its front edge proximate to the rear edge of the discharge table, substantially as and for the purpose specified.

16. In a machine for printing matches, the combination with the feed table,  $T'$ , the convex discharge table,  $G$ , above said feed table, the bed,  $d$ , means for tilting said bed upwardly, and a match holder, of an extractor lever adapted to engage the holder when on the bed, a feed slide for feeding the holder from the feed table,  $T'$ , onto said bed, and mechanism substantially such as described operating to impart a reciprocal successive movement to the extractor and feed slide, whereby the extractor is first moved to remove the holder from the bed onto the discharge table when the bed is tilted upwardly, and a holder on the feed table then fed to said bed when it has returned to its normal position, substantially as set forth.

17. In a machine for printing matches, the combination with the discharge and feed tables,  $G$ , and  $T'$ , arranged one above the other, the bed,  $d$ , means for tilting the bed upwardly to bring its front edge into proximity with the rear edge of the convex discharge table, an extractor lever comprising two angle levers

one at each end of the discharge table,  $G$ , the horizontal arms of which levers are substantially of the same curvature as the said table,  $G$ , and a connecting rod connecting the vertical arms of said levers, the rock shaft,  $b$ , to which said vertical arms are secured, the radial arm,  $b^8$ , the cam shaft,  $W$ , and the cam,  $B$ , of the feed slide,  $b'$ , on table,  $T'$ , the rock shaft,  $b^5$ , the radial arms,  $b^6$ , connected with the feed slide by links, the radial arm,  $b^{18}$ , on rock shaft,  $b^5$ , the threaded rod,  $b^9$ , extending loosely through an aperture in the rod that connects the vertical arms of the extractor angle levers, an abutment on said rod,  $b^9$ , and the spring,  $b^7$ , said elements being arranged and operating substantially as and for the purpose set forth.

18. In a machine for printing matches, the combination with the bed,  $d$ , its rock shaft,  $d'$ , and the sector,  $d^3$ , keyed to one end of said shaft, of the sector,  $d^4$ , in gear with sector  $d^3$ , the cam shaft,  $W$ , cam,  $D$ , weighted lever,  $d^5$ , and connecting rod,  $d^6$ , connecting said lever to sector,  $d^4$ , said elements being arranged and operating substantially as and for the purpose set forth.

19. In a machine for printing matches, the combination with the bed,  $d$ , its rock shaft,  $d'$ , the sector,  $a^3$ , and levers  $f$ , and  $f'$ , loose on said shaft, said lever,  $f$ , having an arm,  $f^2$ , the weighted lever,  $f^9$ , and connecting rod,  $f^8$ , connecting said lever to arm,  $f^2$ , of lever,  $f$ , of the bed,  $a$ , the rock shaft,  $a'$ , thereof having its bearings in levers,  $f$ , and  $f'$ , the springs,  $a^2$ , on said shaft operating to hold the bed in a horizontal plane, and the sector,  $a^4$ , fast on rock shaft,  $a'$ , and in gear with sector,  $a^3$ , said parts being arranged and operating substantially as and for the purpose set forth.

20. In a machine for printing matches, the combination with the bed,  $d$ , its rock shaft,  $d'$ , the sector,  $a^3$ , and levers  $f$ , and  $f'$ , loose on said shaft, said lever,  $f$ , having an arm,  $f^2$ , the weighted lever,  $f^9$ , connecting rod,  $f^8$ , connecting said lever to arm,  $f^2$ , of lever,  $f$ , the bed,  $a$ , the rock shaft,  $a'$ , thereof having its bearings in levers,  $f$ , and  $f'$ , the springs,  $a^2$ , on said shaft operating to hold the bed in a horizontal plane, and the sector,  $a^4$ , fast on the rock shaft,  $a'$ , and in gear with sector,  $a^3$ , of the locking lever,  $f^6$ , adapted to engage the rear end of lever,  $f$ , its spring,  $f^{17}$ , the releasing lever,  $f^4$ , the cam shaft,  $W$ , and cam,  $D$ , thereon, said parts being arranged and operating substantially as and for the purpose set forth.

21. In a machine for printing matches, the match holder  $S$ , consisting of a plate provided with the lateral bearings,  $s^2$ ,  $s^{22}$ , and vertical abutment,  $s^4$ , in combination with the blanket  $s^3$ , divided transversely into compartments, each adapted to contain a single match, substantially as and for the purpose set forth.

22. In a machine for printing matches, the combination with the pivoted bed,  $d$ , provided with a groove at each end, a match holder comprising a plate the ends of which



fit into said grooves, and an elastic blanket  
secured to said plate and divided transversely  
into compartments, each adapted to contain  
a single match, and the pivoted bed, *a*, pro-  
5 vided with an elastic blanket of the same di-  
mensions as those of bed, *d*, said beds lying  
normally in the same horizontal plane one in  
rear of the other, of mechanism substantially  
such as described, operating to first move  
10 both beds toward and in contact with each  
other, then together until the bed, *a*, has re-

turned to its normal position, and finally to  
move the bed, *d*, back into its normal posi-  
tion, whereby the matches are transferred  
from the holder onto the blanket of bed, *a*, 15  
and their position reversed, substantially as  
and for the purpose set forth.

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Witnesses:

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