

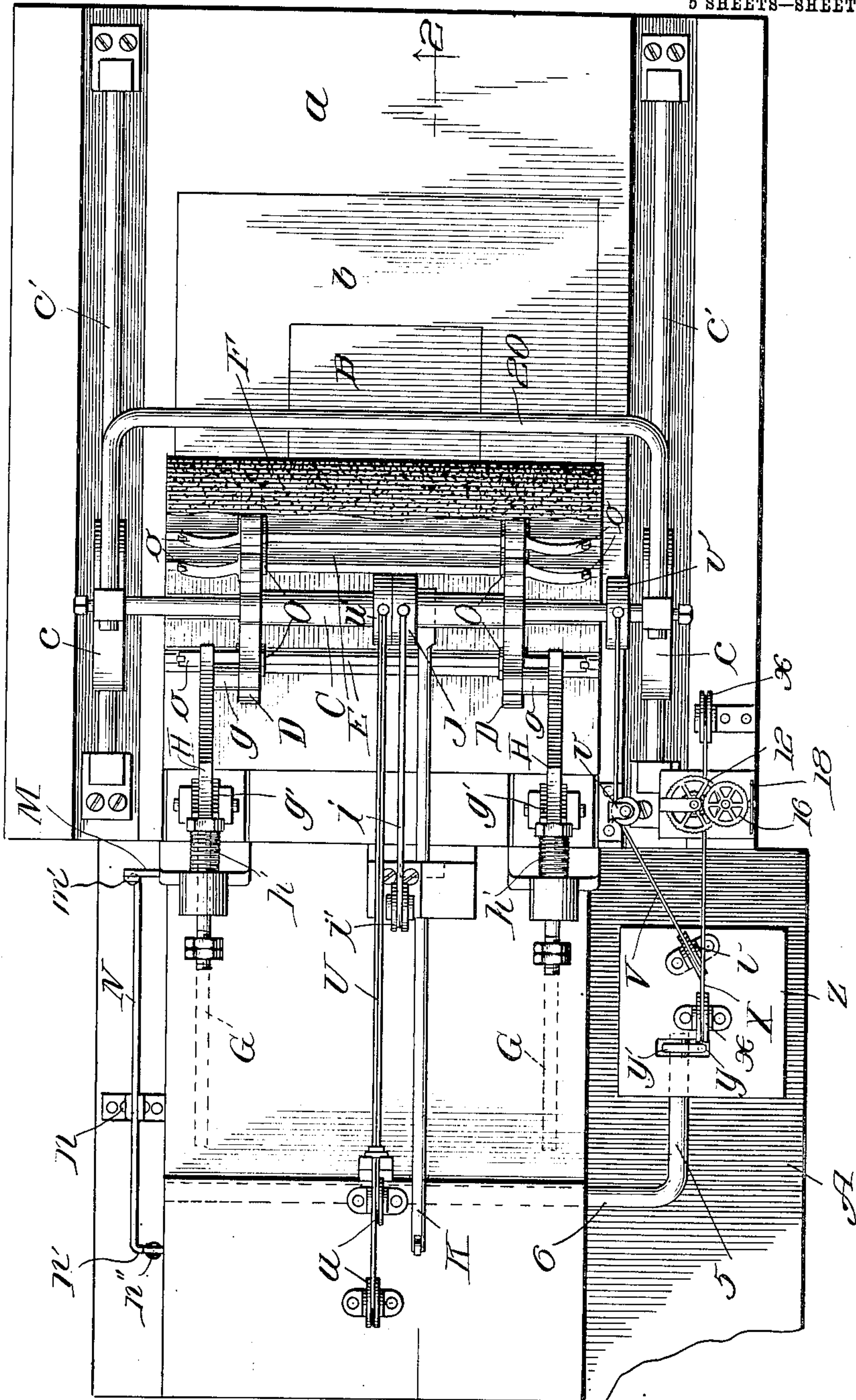
No. 846,767.

PATENTED MAR. 12, 1907.

H. M. WEBSTER.
PHOTOGRAPHIC PRINTING MACHINE.

APPLICATION FILED JAN. 20, 1908.

5 SHEETS—SHEET 1.



Witnesses!

H. S. Carter
H. D. Willis

Inventor:

by Howard M. Webster;
by Wm. B. Bell, atty

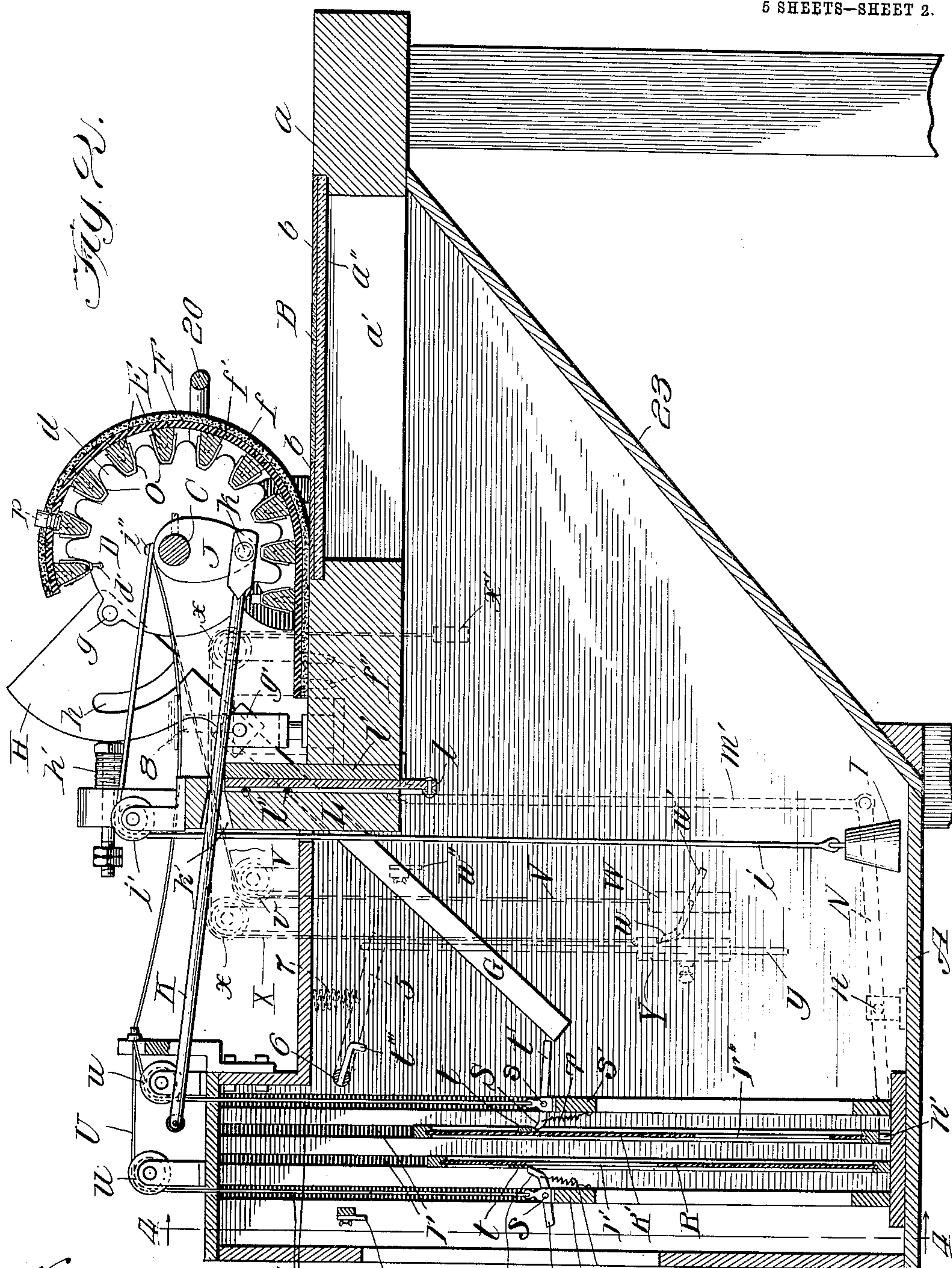
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5 SHEETS—SHEET 2.



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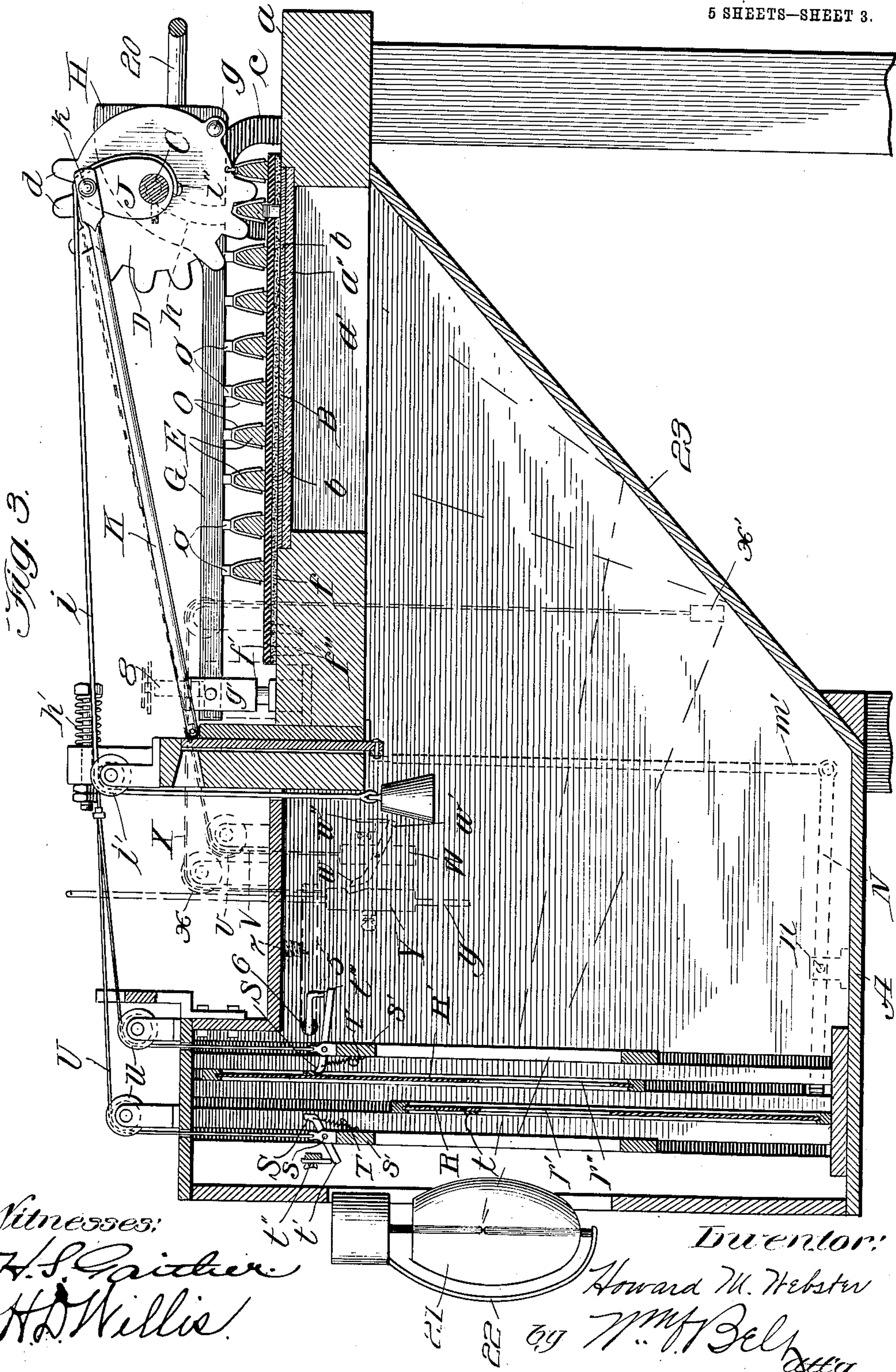
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5 SHEETS—SHEET 3.



Witnesses:

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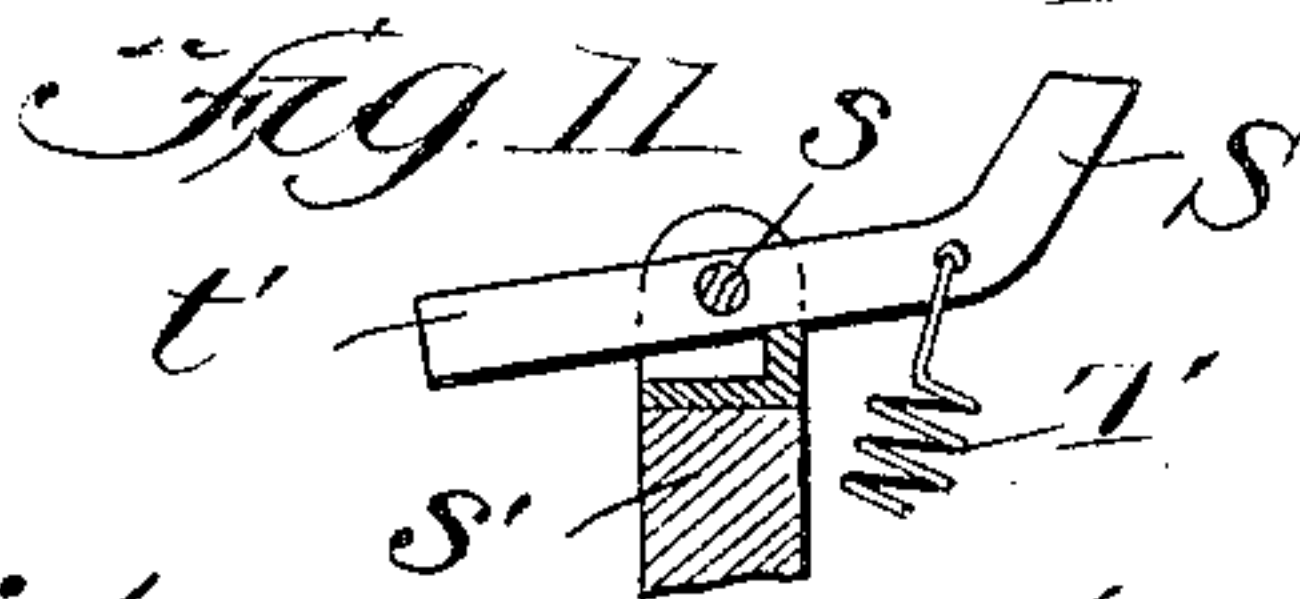
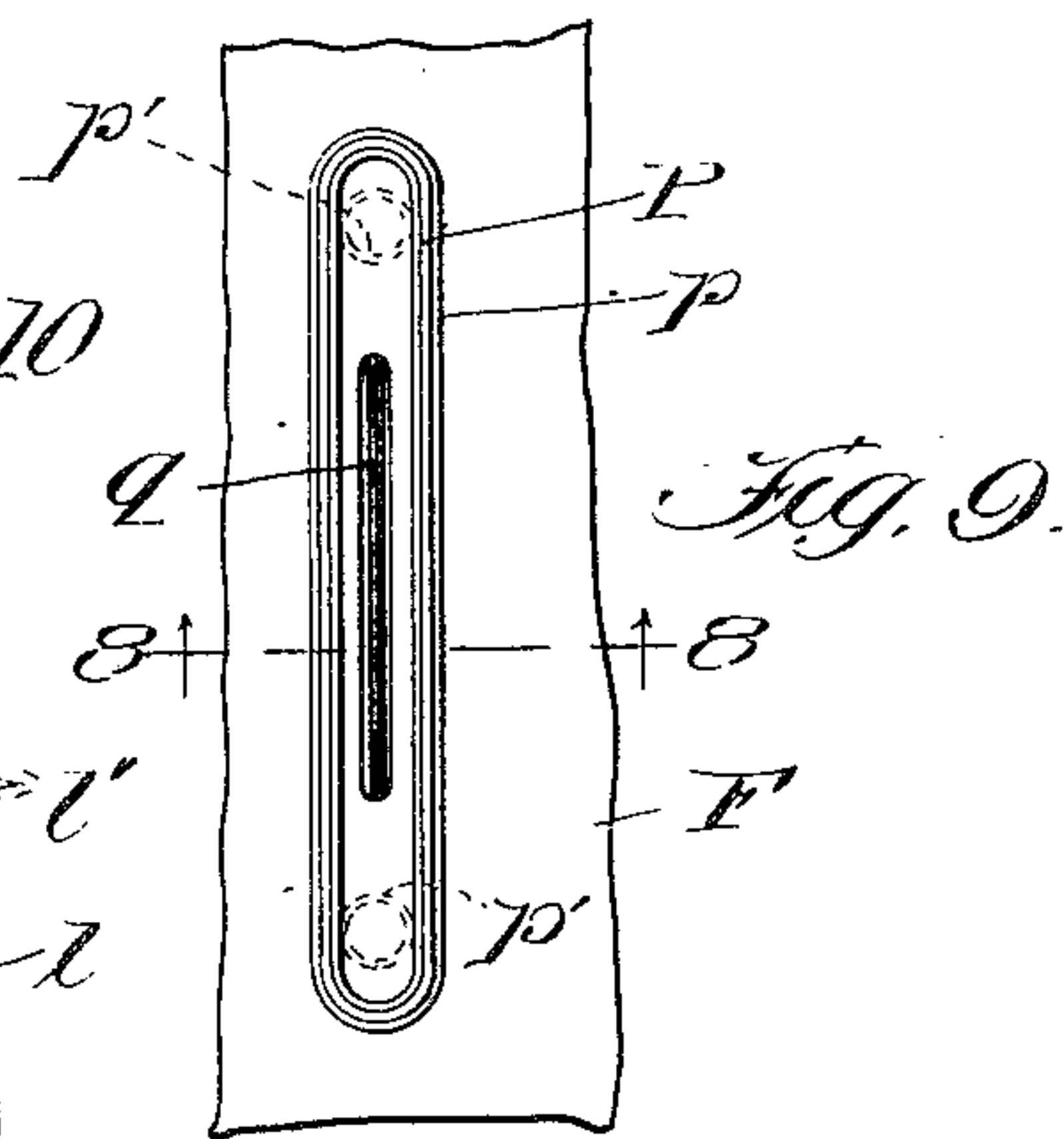
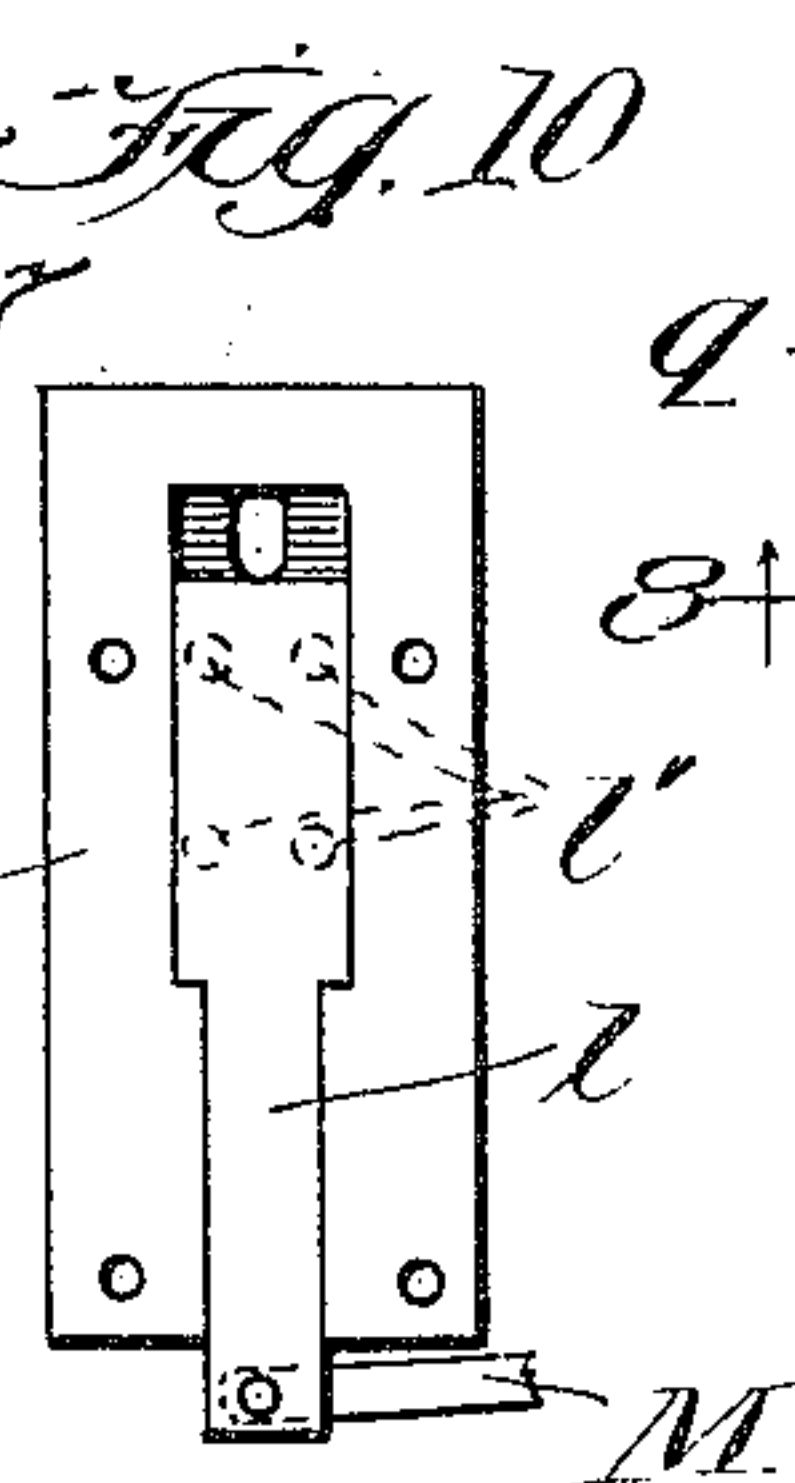
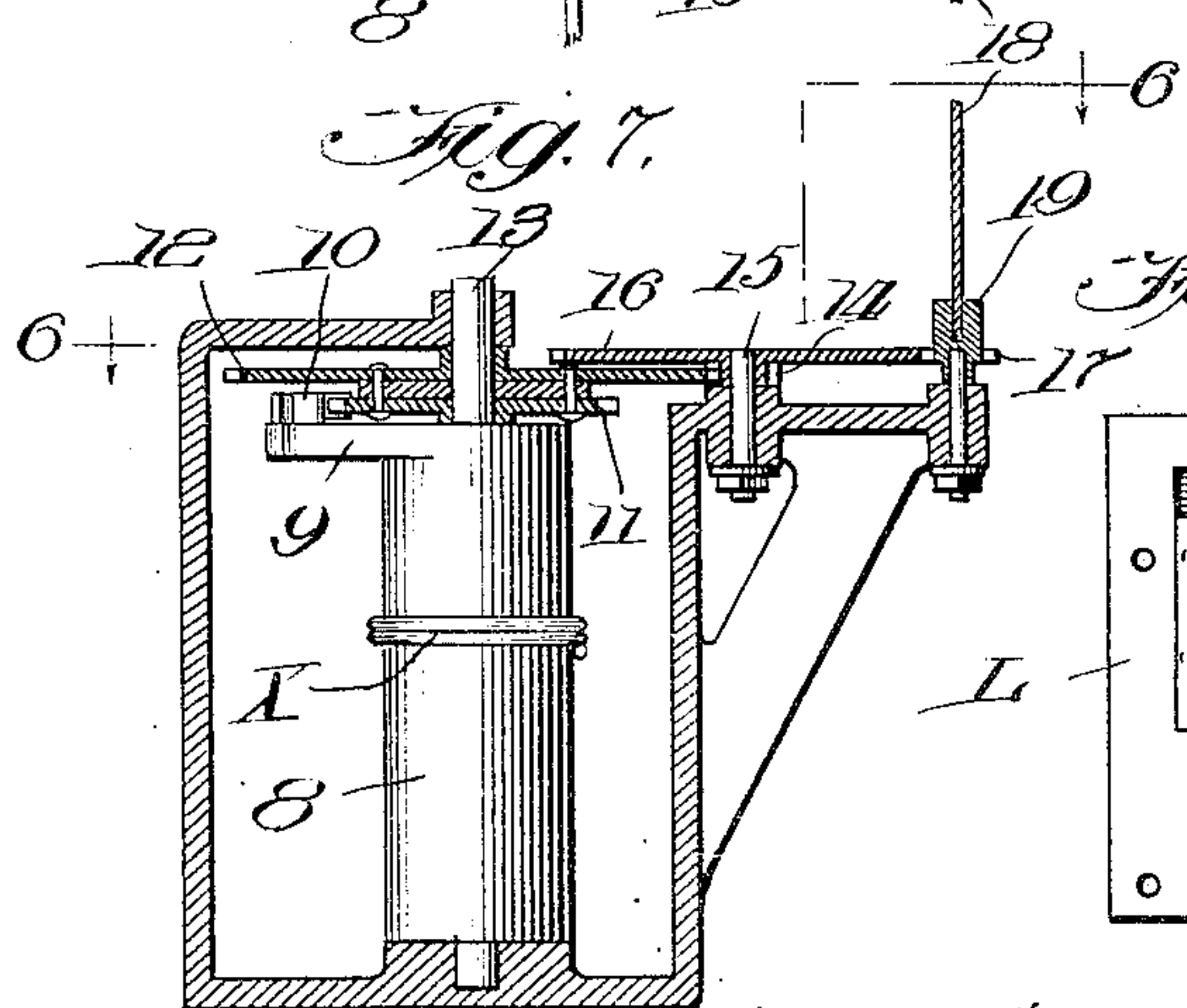
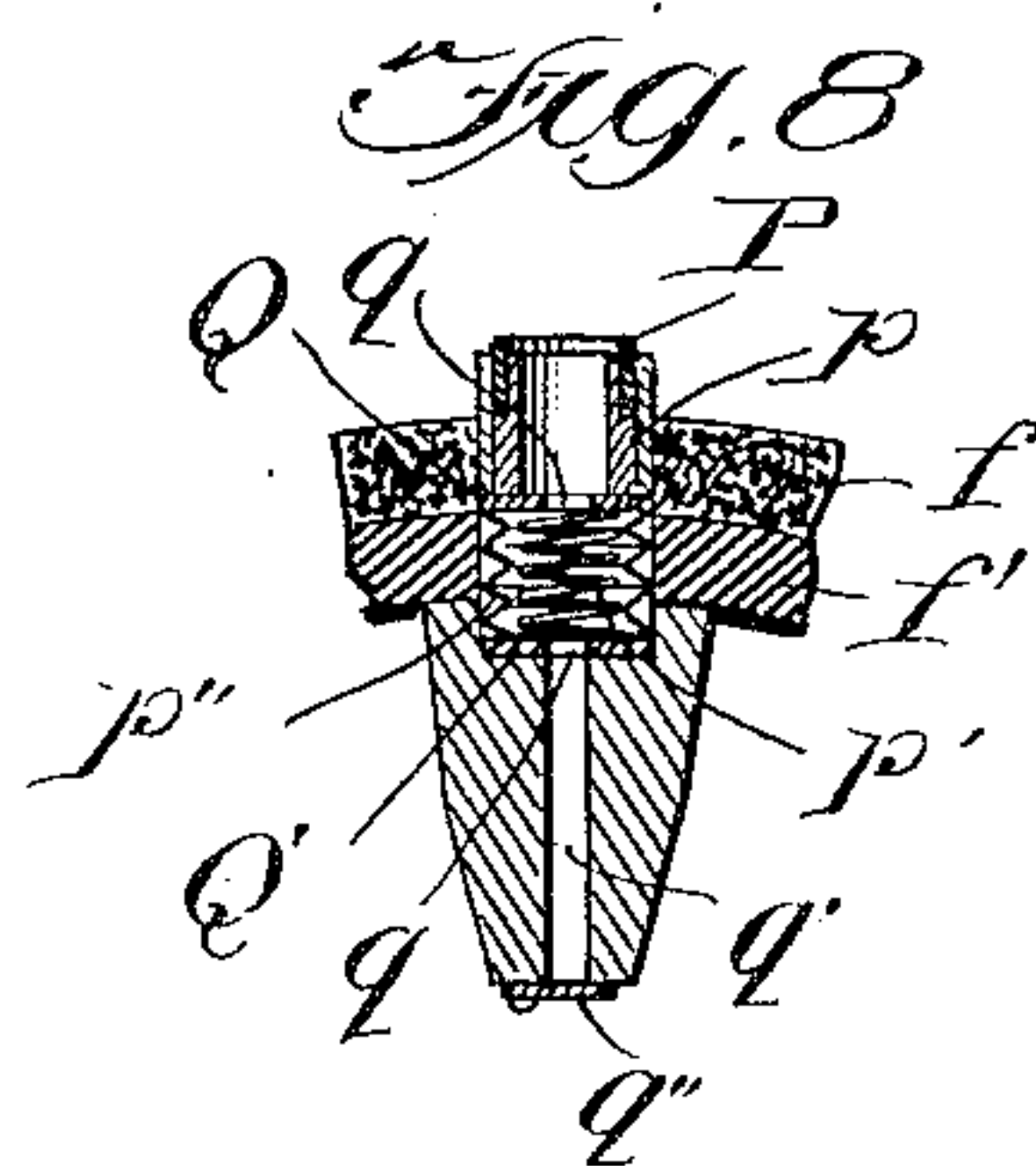
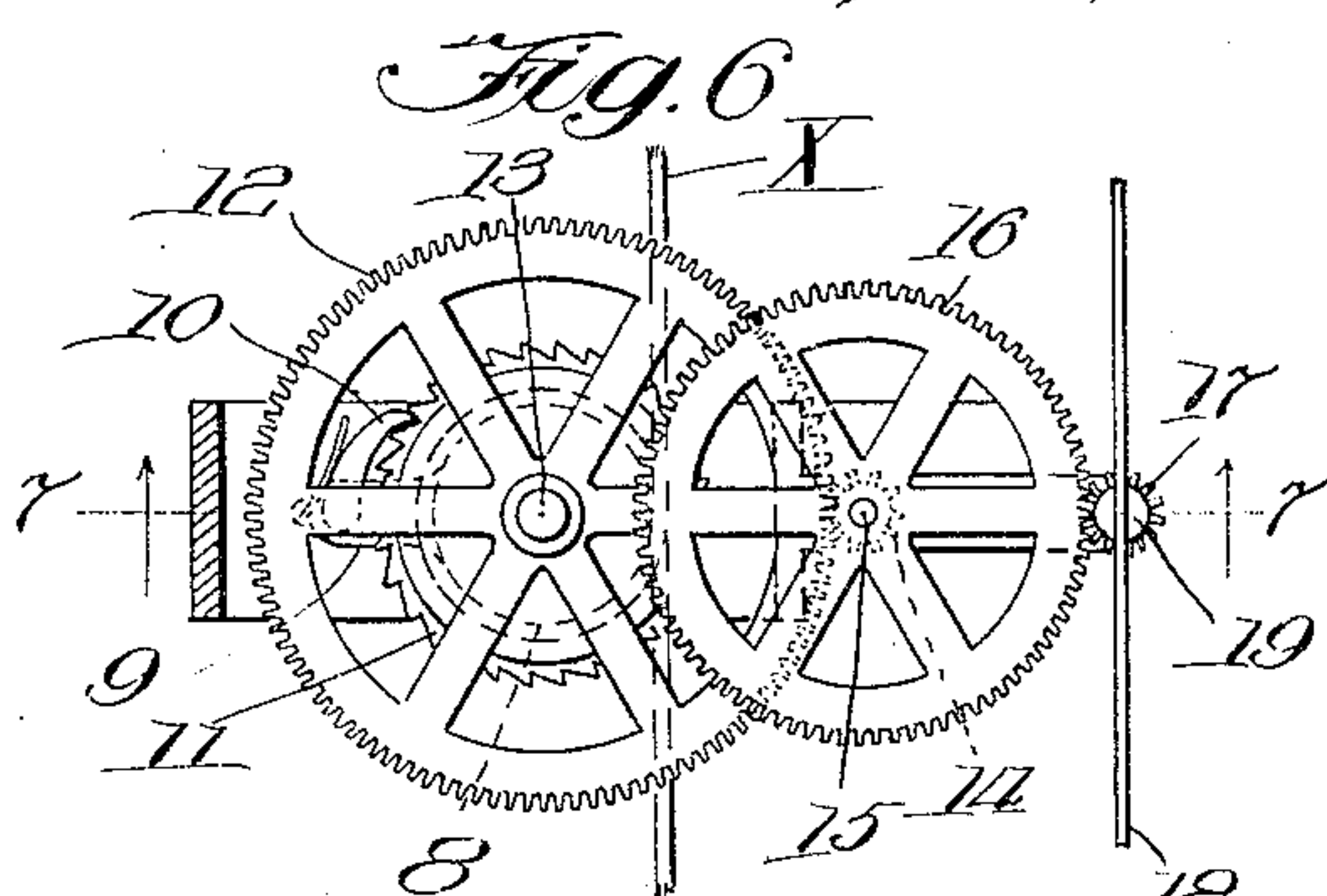
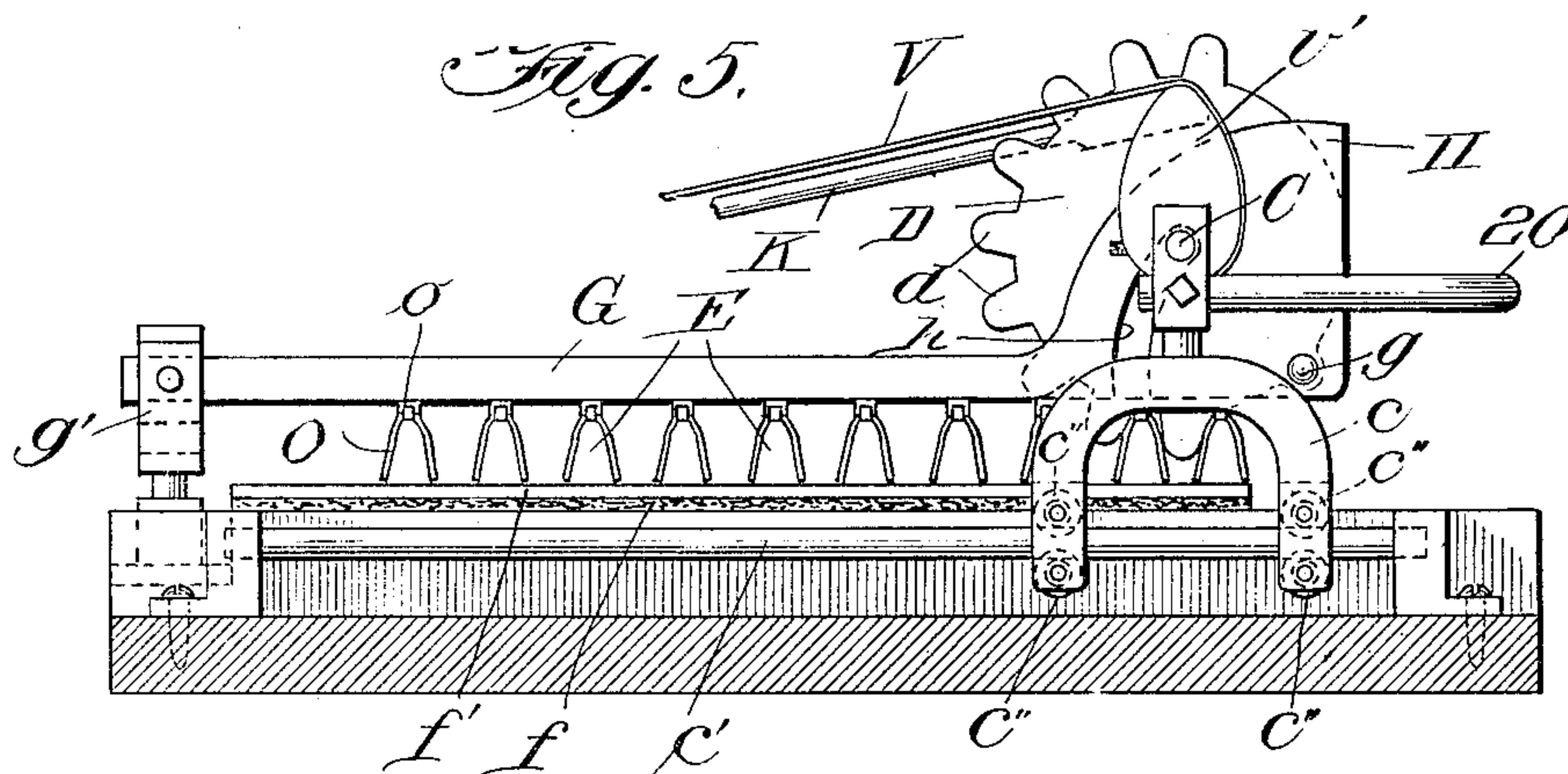
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5 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

HOWARD M. WEBSTER, OF CHICAGO, ILLINOIS.

PHOTOGRAPHIC-PRINTING MACHINE.

No. 846,767.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed January 20, 1906. Serial No. 296,928.

To all whom it may concern:

Be it known that I, HOWARD M. WEBSTER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Photographic-Printing Machines, of which the following is a specification.

The object of this invention is to provide a photographic-printing machine of simple construction and capable of being rapidly and easily operated.

Further objects of the invention are to roll and clamp the printing-paper evenly and securely in place on the negative in printing position, to automatically time the exposure and return the parts to their initial position, and to accomplish various other results, which will be fully pointed out hereinafter.

In the accompanying drawings, Figure 1 is a top plan view of a machine embodying the invention. Fig. 2 is a sectional view on the line 2 2 of Fig. 1. Fig. 3 is a similar view showing the parts in their position during the exposure. Fig. 4 is a sectional view on the line 4 4 of Fig. 2. Fig. 5 is a detail view showing particularly the manner of guiding the pressure-roller. Figs. 6 and 7 are detail sectional views of the timing device. Fig. 8 is a detail sectional view showing the pneumatic suction-cup for removing the paper after being printed. Fig. 9 is a plan view of the suction-cup. Fig. 10 is a detail view of the lock. Fig. 11 is a detail view of one of the lifter-dogs.

Referring to the drawings, A is a frame, of suitable size, shape, and construction, having a bed *a*, provided with an opening *a'*, over which is seated a glass plate *a''*. The negative B is arranged upon this plate and held against lateral movement by removable spacing-strips *b* of any suitable character, Fig. 2. The printing-paper is laid on the negative and then the pressure-roller is rolled forward over the paper and negative and carries the flexible cushion into position to be clamped tightly upon the bed and hold the paper in place on the negative during the exposure. This roller comprises a shaft C, supported at its ends on brackets *c*, which are arranged to travel on guide-rods *c'*, fastened on the frame. These brackets are provided with rollers *c''* to engage the rod and reduce the friction, Fig. 5. Disks D are carried by the shaft C and are provided on a portion of

their periphery with teeth *d*, suitably spaced to engage bars E, fastened transversely on the back of the flexible cushion F. This cushion comprises a bottom layer *f* of thick felt and a top layer *f'* of composition rubber, and it is fastened at one end to the bed at *f''* and at its other end to the disks D at *d'*. The bars E are arranged in parallel relation and form a rack which is engaged by the teeth on the disks.

Pressure is applied to the flexible cushion when extended by pressure-bars G, which are pivotally connected at *g* to the periphery of the disks D and slide freely in swivels *g'*, supported on the bed. As the roller reaches the limit of its forward movement the pressure-bars will be carried down to bear hard upon the rack-bars, and thus clamp the cushion tightly upon the paper and negative. The pressure-bars are enlarged at the end H, which is pivoted to the disks, and this enlarged end is provided with a segmental slot *h* to receive the shaft C. A spring-cushion *h'* is provided on the frame to be engaged by the enlarged end of the bars to relieve the machine from shock on the return movement of the pressure-roller to initial position. This return movement of the pressure-roller is produced by a weight I, carried by a cord *i*, which passes over a pulley *i'* and is attached at *i''* to a cam J, fastened on the shaft C. A rod K is pivoted at *k* to the outer end of the cam J and travels through an opening *k'* in the standard L. A locking-plate *l* is arranged between the standard L and the face-plate *l'*, fastened to the frame. This locking-plate travels on ball or roller bearings *l''* and is pivotally connected at its lower end to one end of a horizontal lever M, pivoted to the frame at *m* and pivotally connected at its outer end by a link *m'* to a lever N, which is pivoted at *n* and has an inturned end *n'*, Fig. 2. When the weight of the shutter is lifted from the inturned end of the lever N, as hereafter described, a spring *n''* will swing the lever N, and thereby move the locking-plate from the position shown in Fig. 2 to the position shown in Fig. 3, this movement taking place immediately after the locking-rod K has been pulled forward through the opening *k*. In this position the end of the locking-rod rests upon the face-plate *l'* and against the locking-plate *l* and holds the roller in its forward position.

To provide for an even distribution of pres-

sure by the pressure-bars on the rack-bars, I mount on each rack-bar a shoe O, which has a spring-arm o, projecting therefrom beneath the rack-bars. The pressure-bars will bear directly upon these springs, which in turn bear upon the rack-bars, and thus the pressure of the pressure-bars will be evenly distributed over the entire surface of the cushion. For the purpose of picking up the paper on the return movement of the roller I provide the roller with one or more pneumatic suction-cups, Fig. 8, comprising a rubber ring P, carried by a cup p and normally projected beyond the face of the flexible cushion by a spring p', inclosed within a diaphragm p''. The diaphragm is fastened at its ends to plates Q Q', having openings q, and the rack-bar behind the suction-cup has an opening q', closed at its outer end by a valve q''. When the roller travels over the bed, the cup will be forced upward into the cushion and the air will escape through the valve q''. On the return movement of the roller the cup will pick up and carry the paper, so that it can be easily removed by the operator. The shutters R R' travel in guideways r at one end of the frame, and they are provided with openings r' r'', which are normally arranged out of register, Fig. 2. The shutters are simultaneously raised to elevated position by lifting-dogs S, pivotally mounted at s on skeleton frames s', which travel in guideways s'', adjacent to the shutter-guideways. Springs T hold the dogs in position to engage projections t on the shutters, and the dogs have extensions t' to engage the trippers t'' t'''. Cords U, traveling on pulleys u, are connected at one end to the lifter-dogs and at the other end to a cam u' on the main shaft c. A cord V, traveling on pulleys v, is attached at one end to a cam v' and at its other end carries a weight W. A lifting-dog w is pivotally mounted on the weight W and has an extension w' beyond its pivot to engage a fixed tripper w'' on the frame.

A cord X, traveling on pulleys x, carries at one end a weight x' and at its other end is fastened to a weight Y, which is adjustably mounted on a rod y. The weights W and Y are arranged one behind the other and are guided in the uprights Z, Fig. 4. The upper end of the rod y is provided with a hook y', which engages a lever-arm 5, fastened on the shaft 6, which is mounted on the main frame and carries the tripper t''. A spring 7 is fastened to the main frame and the lever-arm 5 to pull the lever and the tripper into the position shown in Fig. 3 when the rod y begins its upward movement. The cord X is wound two or three times around a drum 8, Figs. 6, 7, which is provided with an arm 9, carrying a spring-pawl 10, arranged to engage a ratchet-wheel 11. This ratchet-wheel is fastened to a gear-wheel 12, and both are

mounted loosely on the axle 13 of the drum. The gear-wheel 12 meshes with a pinion 14, mounted on a spindle 15, which carries a large gear 16, meshing with a pinion 17. A fan 18 of any suitable character is mounted on a post 19, secured to the pinion 17.

In practice a negative is properly arranged on the bed-plate a'', and a sheet of printing-paper is placed on the negative. Then the roller is moved forward over the negative and printing-paper by pulling on the handle 20, until it reaches the limit of its forward movement and is there locked by the plate L. By spreading the flexible cushion over the negative and printing-paper with a rolling action the paper is not likely to be disturbed or wrinkled, and the pressure is applied throughout the cushion to securely hold the paper in place and form a light-tight back therefor during the exposure. When the roller is carried forward, the return-weight I is lifted, and both shutters are carried upward by the lifting-dogs until finally one of said dogs is tripped by engagement with the tripper t'' and is thereby released from its shutter R, which falls to its lowest position, while the other shutter R' remains in its elevated position. Then the opening r' is in register with the opening c'', and the light from the lamp 21 will be reflected through these openings by a reflector 22 against the reflector 23, and thence upward through the glass a'' to the negative and printing-paper. The other shutter is held by its lifting-dog in elevated position because the tripper t''' has been moved to the position shown in Fig. 3 by the spring 7 and the disengagement of the rod y from the lever 5. The cord V has lifted the weight W; and the lifting-dog w has carried upward the weight Y and the rod y. As the weights w and y are raised the weight x' falls and pulls the cord X around the drum, the pawl 10 riding freely over the ratchet 11. As the pressure-roller reaches its forward position the tripper w'' trips the dog w to release the weight Y, the pawl engages the ratchet 11, and the resistance of the fan acts as a brake on the drum and retards the descent of weight Y and rod y.

The movement of the parts is timed so that at the instant the roller is locked the shutter R falls to bring its opening in register with the opening in the shutter R', thus beginning the exposure, and the lifting-dog w is released from engagement with the weight Y, which thereupon begins to descend, carrying with it the rod y to time the exposure. When the hooked end y' of the rod y engages the lever 5, it will swing the tripper t''' downward to release the dog S from engagement with the shutter R', and thereupon the shutter will fall to carry its opening out of register with the opening in the shutter R and end the exposure. When the shutter R reaches the limit of its downward movement, it

strikes the inturned end n' of the lever N and operates its lever to pull the locking-plate L downward and release the locking-rod K, and the weight I can then return the pressure-roller to its initial position. At the same time the weight W and the dogs S and w will return to their initial positions, and the operation is complete.

The machine can be easily operated and aside from the necessity for pulling the pressure-roller to its forward position is automatic in its action. The exposure cannot take place until the flexible cushion is clamped securely upon the bed, and the time of the exposure can be regulated as desired. The flexible cushion is spread evenly over the bed during the forward movement of the roller, and this operation is effected in a horizontal plane, which makes it very easy for the operator. To further lighten the work of the operator, I provide the cams J, u' , and v' on the shaft C and connect the cords to these cams to the nearest point to the shaft. The leverage of cam J increases gradually on the forward movement and decreases gradually on the return movement of the roller, and consequently it is easy to start the roller on its forward movement. On the return movement the roller will start quickly and gradually slow down as it reaches initial position. The leverage of the other cams corresponds to that of cam J.

The length of the exposure is governed by the distance traveled by the weight Y on its downward movement, and the speed of this movement of the weight is controlled by the fan 18. The length of the upward movement of the weight Y can be regulated by the cam v' and the tripper w'' .

The machine can be operated rapidly and with comparatively little power. After the operator has pulled the roller forward to locked position he may release the handle 20 and pay no further attention to the machine until he finds it automatically returned to its initial position and ready to receive another sheet of printing-paper. This gives the operator ample opportunity to feed the paper to the machine and take care of the sheets as they are removed from the machine without interrupting its continuous rapid operation. By reason of the fact that the flexible cushion is spread over the bed with a rolling action the operator may hold the paper in place on the negative until it is caught by the cushion and without danger of injury to his fingers.

What I claim, and desire to secure by Letters Patent, is—

1. In a photographic-printing machine, the combination of a horizontal bed, a roller, a thick flexible contact-cushion fastened at one end to the bed and at its other end to the roller, and a handle attached to the front of the roller for moving said roller forward to spread the cushion over the bed.

2. In a photographic-printing machine, the combination of a bed, a flexible cushion, rack-bars on said cushion, a roller comprising toothed disks arranged to engage the rack-bars, and means for moving said roller to spread the cushion over the bed.

3. In a photographic-printing machine, the combination of a bed, a roller comprising toothed disks, a flexible cushion fastened at one end to the bed and at its other end to said roller, rack-bars on said cushion to mesh with the teeth on the disks, and means for moving said roller to spread the cushion over the bed.

4. In a photographic-printing machine, the combination of a bed, a flexible contact-cushion, a roller for spreading said cushion over the bed, and means for applying a yielding pressure to the back of the cushion after it has been spread over the bed.

5. In a photographic-printing machine, the combination of a bed, a thick flexible contact-cushion, means for spreading said cushion over the bed, and pressure-bars arranged to apply pressure on the cushion after it has been spread over the bed.

6. In a photographic-printing machine, the combination of a bed, a flexible contact-cushion, a roller for spreading said cushion over the bed, and means actuated by said roller for applying pressure to the cushion after it has been spread over the bed.

7. In a photographic-printing machine, the combination of a bed, a flexible contact-cushion, a roller for spreading the cushion over the bed, and pressure-bars connected to said roller and arranged to be operated thereby to press upon the cushion after it has been spread over the bed.

8. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller, bars on the cushion, and pressure-bars connected to the roller and actuated thereby to bear upon the cushion-bars after the cushion has been spread over the bed.

9. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller, rack-bars on the cushion, teeth on the roller to mesh with said rack-bars, and pressure-bars carried by said roller and arranged to bear upon said rack-bars when the cushion is spread over the bed.

10. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller, rack-bars on the cushion, teeth on the roller to mesh with said rack-bars, springs on said rack-bars, and pressure-bars carried by the roller and arranged to bear upon said springs when the cushion is spread over the body.

11. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller, rack-bars on the cushion, teeth on the roller to mesh with said rack-bars, swivels on the bed, and pressure-bars slidably arranged in said swivels and pivotally connect-

ed to the roller to bear upon the rack-bars when the cushion is spread over the bed.

12. In a photographic-printing machine, the combination of a bed, a roller, a flexible cushion fastened at one end to the bed and at its other end to the roller, rack-bars on the cushion, teeth on the roller to mesh with the rack-bars on the cushion, shoes on the rack-bars, springs carried by said shoes, swivels on the bed, and pressure-bars slidably arranged in said swivels and pivotally connected to the roller and adapted to be actuated by the roller to bear upon said springs when the cushion is spread over the bed.

13. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller for spreading said cushion over the bed, means for returning the roller to its initial position, and a yielding stop for the roller.

14. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller for spreading said cushion over the bed, pressure-bars actuated by the roller to bear upon the cushion after it is spread over the bed, a weight for returning the roller to its initial position, and yielding stops arranged to be engaged by the pressure-bars.

15. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller for spreading said cushion over the bed, and means actuated by the roller for locking said cushion on the bed.

16. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller for spreading the cushion over the bed, a locking-rod carried by said roller, a locking-plate, and means for interposing the plate in the path of said rod when the roller reaches the limit of its forward movement.

17. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller for spreading the cushion over the bed, a locking-rod carried by the roller, a locking-plate, a lever for operating said plate to engage the rod, and a shutter for operating said lever.

18. In a photographic-printing machine, the combination of a bed, a flexible cushion, a roller for spreading the cushion over the bed, a standard having an opening therein, a locking-rod pivotally connected to the roller and slidably arranged in said opening, a locking-plate, a face-plate, and means for automatically moving said locking-plate over said opening when the end of the locking-rod rests upon the face-plate to lock the roller in its forward position.

19. In a photographic-printing machine, the combination of a pair of shutters provided with openings normally arranged out of register with each other, means for simultaneously lifting said shutters, means for releasing one shutter so that it may fall by grav-

ity to lowered position with its opening in register with the opening in the other shutter in elevated position, and means for releasing said other shutter at the end of the exposure.

20. In a photographic-printing machine, the combination of a pair of shutters provided with openings normally arranged out of register, lifting-dogs, means for operating said lifting-dogs to carry the shutters simultaneously into elevated position, and means for automatically releasing the lifting-dog from one shutter to permit said shutter to fall to lowered position with its opening in register with the opening in the other shutter in elevated position, and means for automatically operating the other lifting-dog at the end of the exposure to permit its shutter to fall to lowered position with its opening out of register with the opening in the other shutter.

21. In a photographic-printing machine, the combination of a pair of shutters, a pair of lifting-dogs, a stationary tripper for operating one lifting-dog, a movable tripper for operating the other lifting-dog, and means for lifting said dogs.

22. In a photographic-printing machine, the combination of a pair of shutters provided with openings normally out of register with each other, means for lifting said shutters to elevated position and comprising lifting-dogs, a stationary tripper for operating one lifting-dog, a movable tripper for operating the other lifting-dog, and timing means for operating said movable tripper.

23. In a photographic-printing machine, the combination of a bed, a flexible contact-cushion, a roller for spreading the cushion over the bed, a shutter mechanism, and means actuated by the roller for operating said shutter mechanism to start the exposure.

24. In a photographic-printing machine, the combination of a bed, a flexible contact-cushion, a roller for spreading the cushion over the bed, a shutter mechanism, and means actuated by the roller for operating said shutter mechanism to end the exposure.

25. In a photographic-printing machine, the combination of a bed, a flexible contact-cushion, a roller for spreading the cushion over the bed, a shutter mechanism, means actuated by the roller for operating said shutter mechanism to start the exposure, and means actuated by the roller for operating the shutter mechanism to end the exposure.

26. In a photographic-printing machine, the combination of a shutter mechanism, means for timing the exposure comprising a weighted device for operating said shutter mechanism to end the exposure, a drum, a cord fastened to said device and wound around said drum, and means for regulating

the movement of said drum to control the movement of said device and time the exposure.

27. In a photographic-printing machine, the combination of a shutter mechanism, a weighted device for operating the shutter mechanism to end the exposure, a drum, a cord wound around said drum and carrying a weight at one end and connected at its other end to said device, means for lifting said device, and means for regulating the movement of said drum to control the movement of said device and time the exposure.

28. In a photographic-printing machine, the combination of a shutter mechanism, a weighted device for operating the shutter mechanism to end the exposure, a drum, a cord wound around said drum and carrying a weight at one end and attached to said device at its other end, a roller, a cord fastened to said roller and carrying a weight, a lifting-dog on said weight arranged to lift said device, a tripper to release said dog from said device, and means for controlling the movement of said device.

29. In a photographic-printing machine,

the combination of a shutter mechanism, a movable tripper to operate said shutter mechanism and end the exposure, a lever for operating said tripper, a weighted rod to operate said lever, means for lifting said rod out of engagement with said lever, and timing means for controlling the descent of said rod into engagement with said lever.

30. In a photographic-printing machine, the combination of a bed, guide-rods alongside the bed, carriages arranged to travel on said rods, a shaft mounted in said carriages, disks carried by said shaft, and a flexible cushion fastened at one end to the bed and at its other end to said disks.

31. In a photographic-printing machine, the combination of a bed, a pressure-roller arranged to travel over the bed, and a pneumatic suction-cup carried by said roller to pick up the paper on the return movement of the roller.

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Witnesses:

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