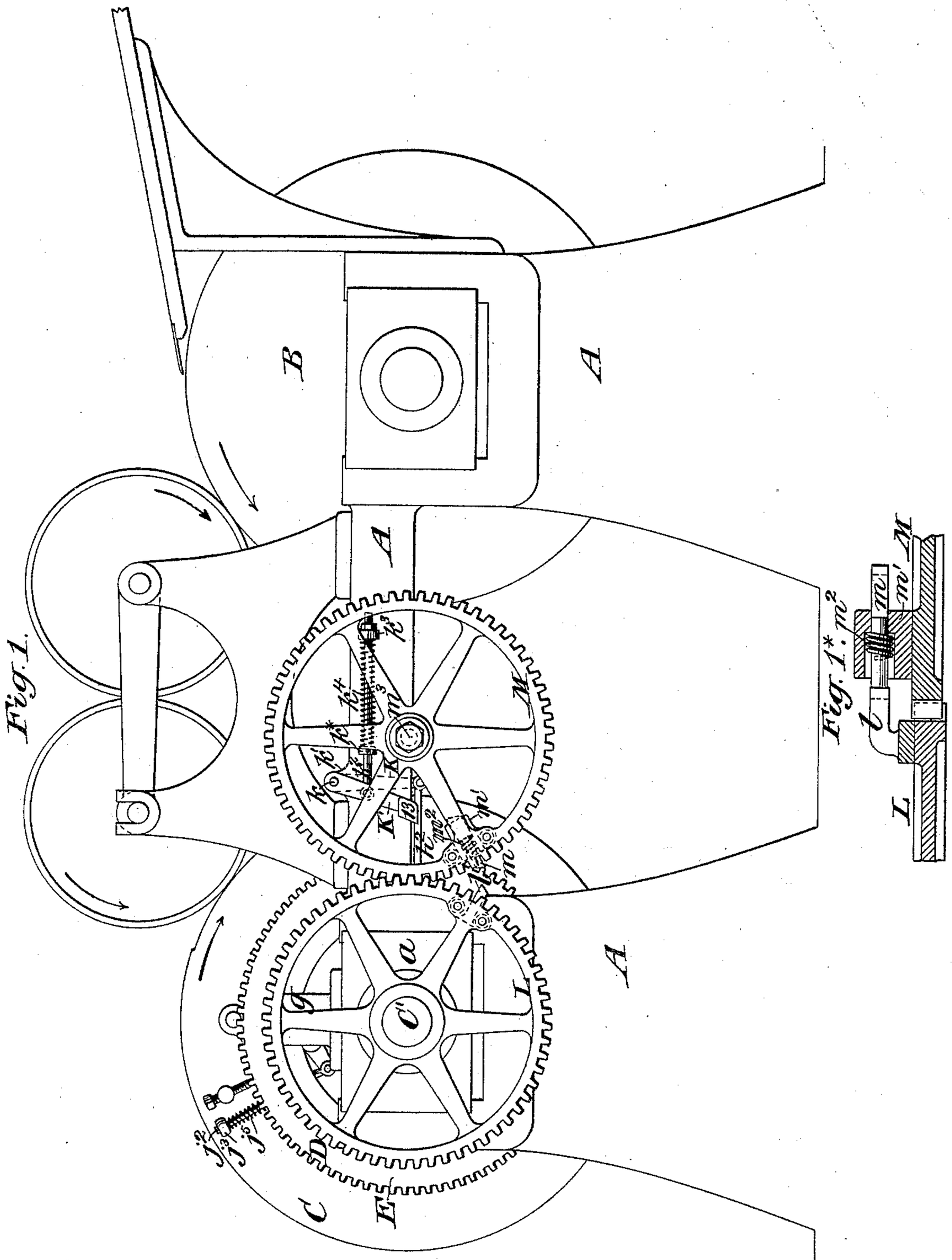
(No Model.) 5 Sheets—Sheet 1.

C. B. COTTRELL.

OFFSET MECHANISM FOR PRINTING MACHINES.

No. 467,637. Patented Jan. 26, 1892.



Witnesses:
C. L. Sundgren
D. H. Haywood

Inventor
Calvert B. Cottrell
by attorneys
Fromm & Seward

(No Model.) 5 Sheets—Sheet 2.

C. B. COTTRELL.

OFFSET MECHANISM FOR PRINTING MACHINES.

No. 467,637. Patented Jan. 26, 1892.

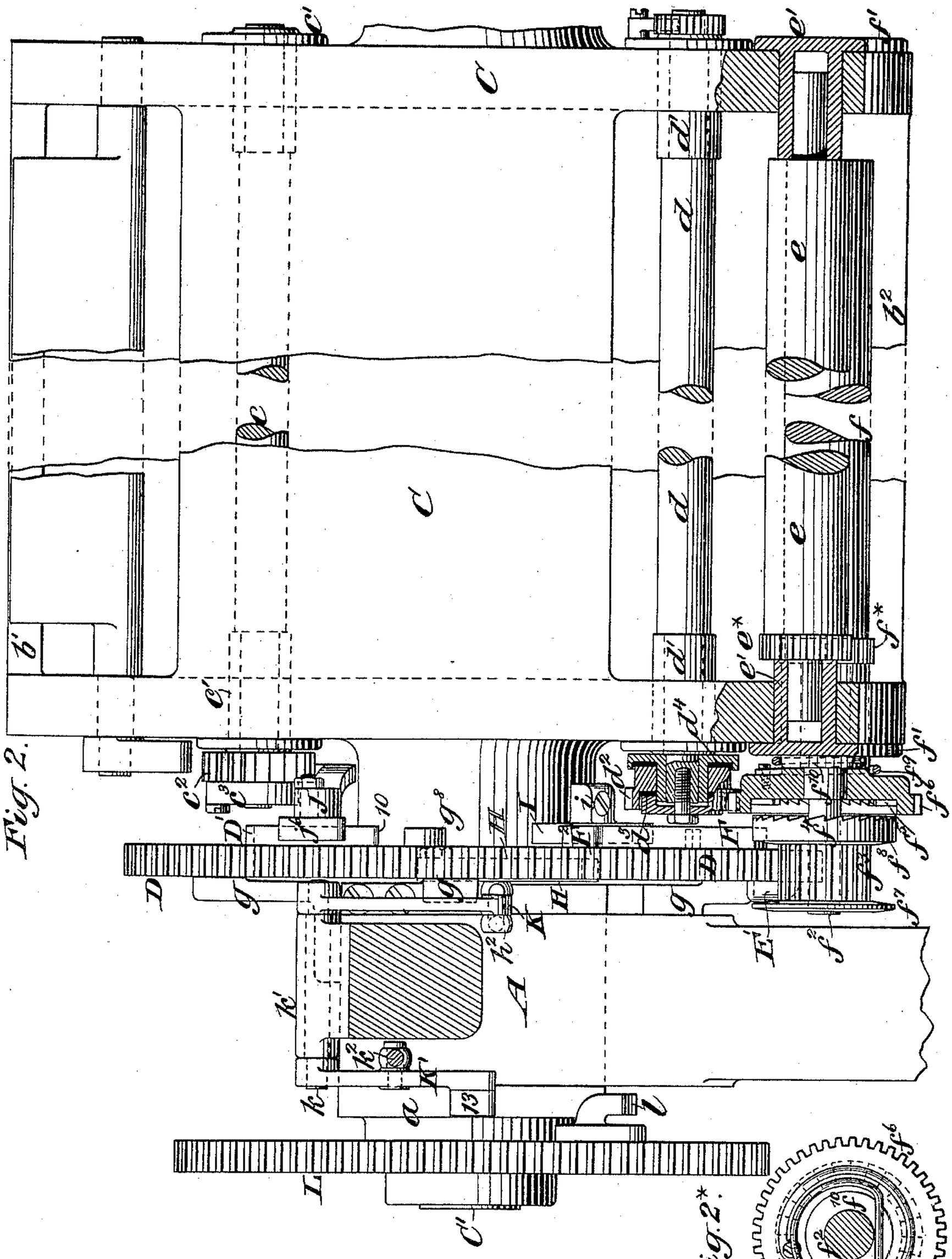


Fig. 2.

Fig. 2*.

Witnesses:
O. L. Sundgren
D. N. Kaijoorn

Inventor:
Calvert B. Cottrell
by attorneys
Brown & Seward

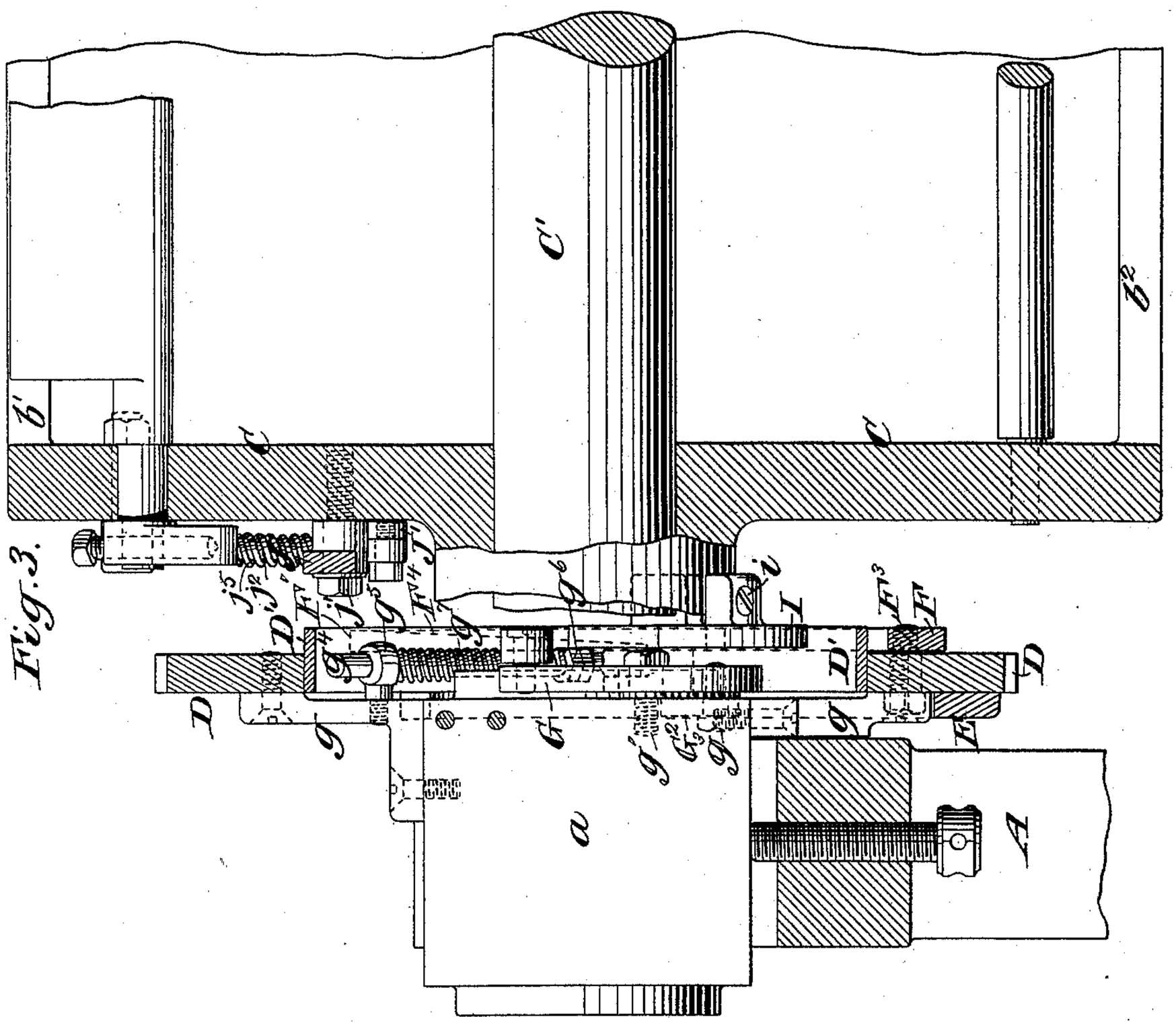
(No Model.) 5 Sheets—Sheet 3.

C. B. COTTRELL.

OFFSET MECHANISM FOR PRINTING MACHINES.

No. 467,637. Patented Jan. 26, 1892.

Fig. 3.



Witnesses:
C. L. Sundgren
D. H. Haywood

Inventor:
Calvert B. Cottrell
by attorneys
Brown & Seward

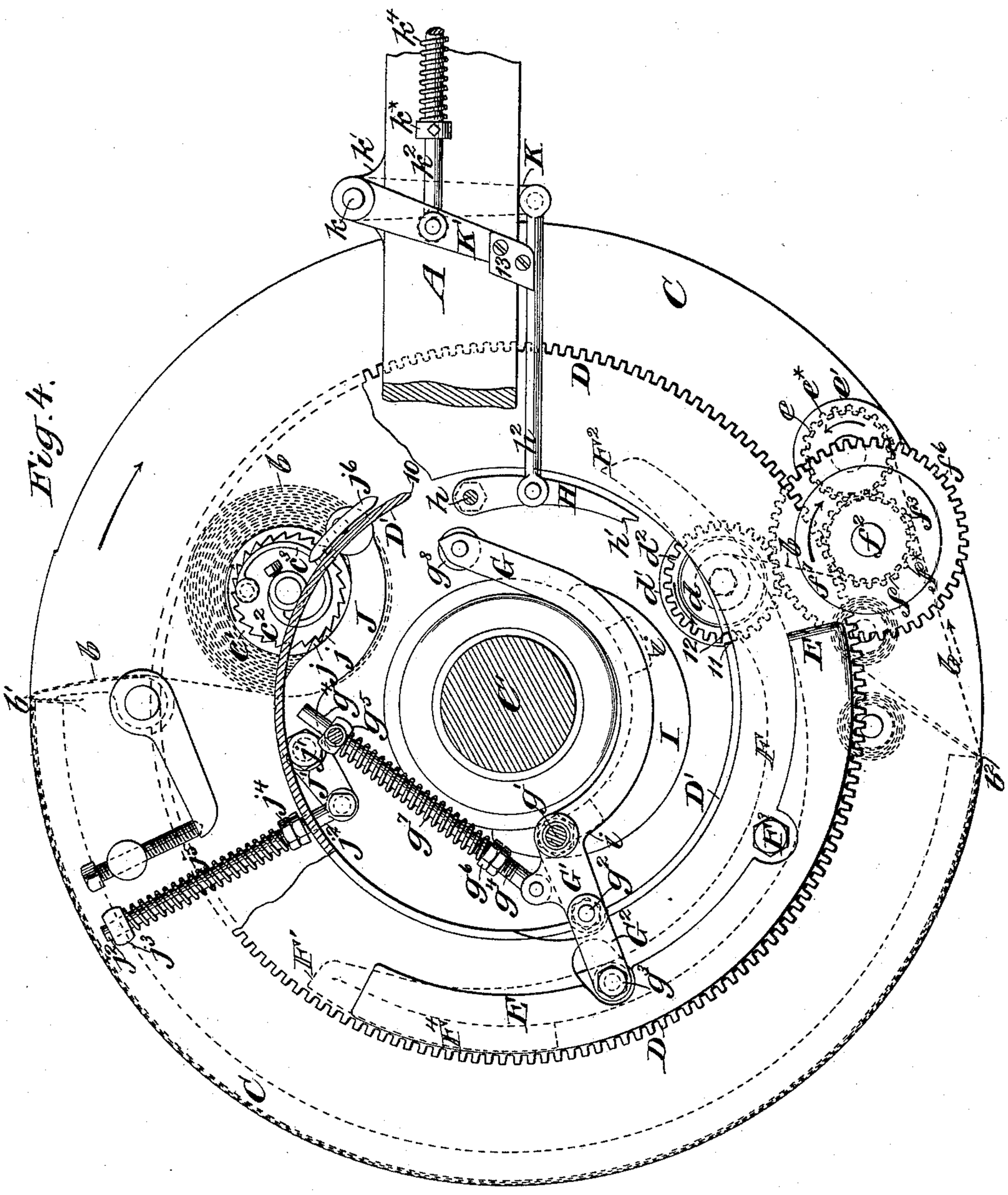
(No Model.) 5 Sheets—Sheet 4.

C. B. COTTRELL.

OFFSET MECHANISM FOR PRINTING MACHINES.

No. 467,637. Patented Jan. 26, 1892.

Fig. 4.



Witnesses:
C. L. Sundgren
W. A. Mayroot

Inventor:
Calvert B. Cottrell
by attorneys
Brown & Seward

(No Model.) 5 Sheets—Sheet 5.

C. B. COTTRELL.

OFFSET MECHANISM FOR PRINTING MACHINES.

No. 467,637. Patented Jan. 26, 1892.

Fig. 5.

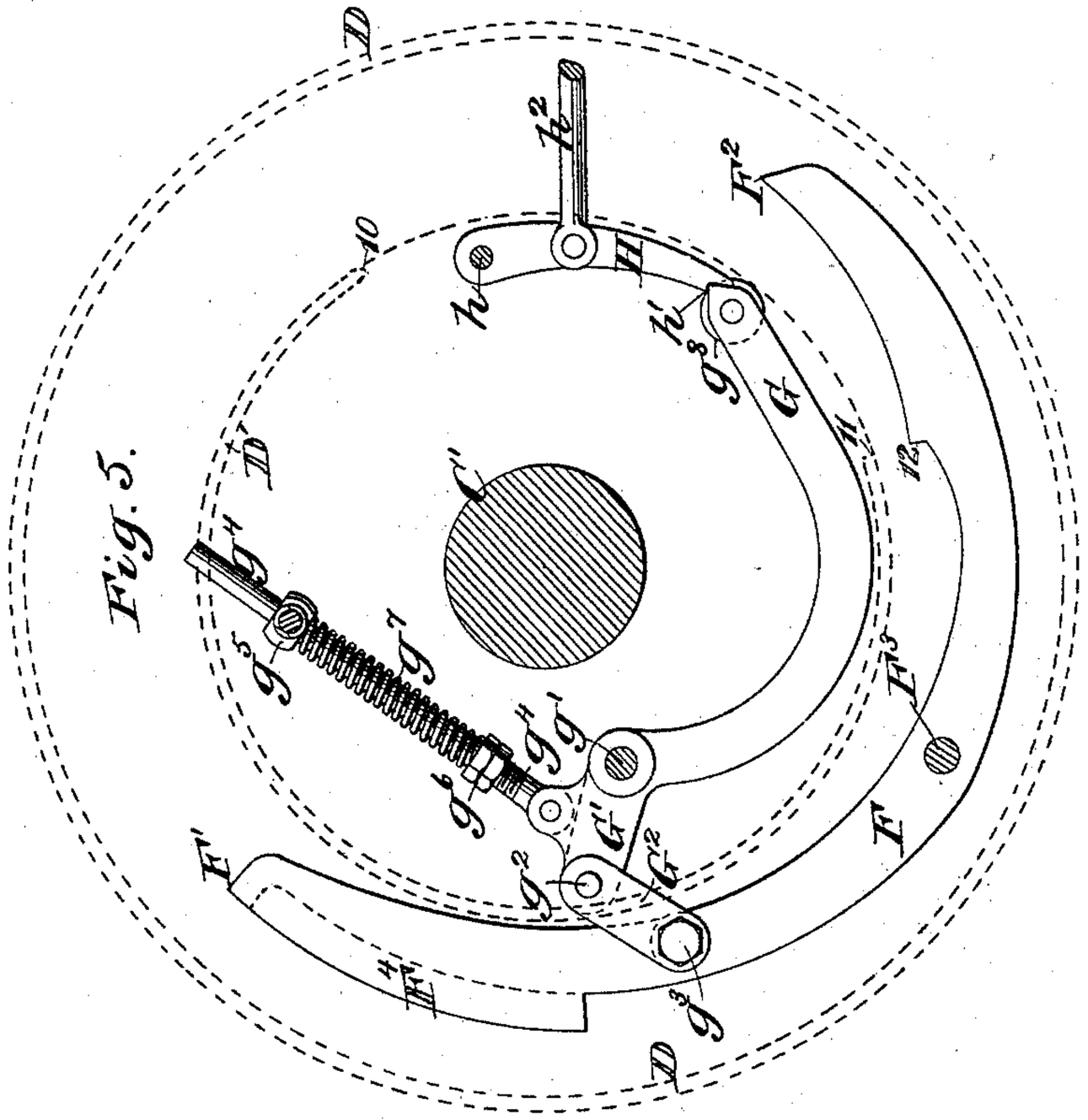
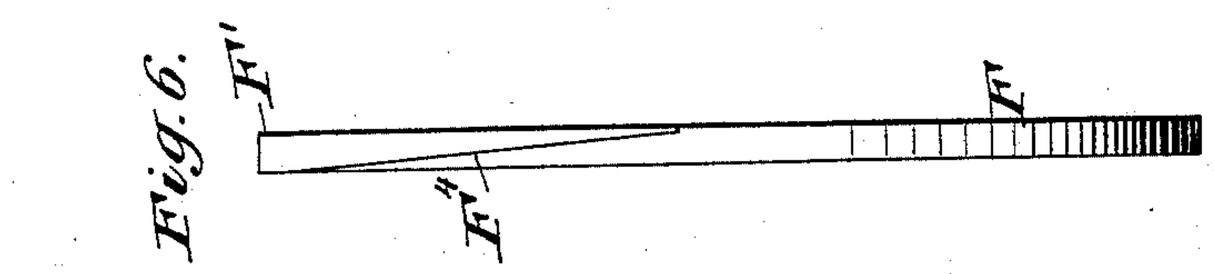


Fig. 6.



Witnesses:
C. L. Sundgren
D. N. Hayward

Inventor:
Calvert B. Cottrell
by attorneys
Brown & Lewis

UNITED STATES PATENT OFFICE.

CALVERT B. COTTRELL, OF WESTERLY, RHODE ISLAND.

OFFSET MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 467,637, dated January 26, 1892.

Application filed April 10, 1891. Serial No. 388,420. (No model.)

To all whom it may concern:

Be it known that I, CALVERT B. COTTRELL, of Westerly, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Offset Mechanism for Printing-Machines, of which the following is a specification.

This invention relates to means whereby a tympan, after a certain number of revolutions of the impression-cylinder of the printing-machine to which it is attached, is automatically shifted during a single revolution of the impression-cylinder to present a fresh and clean tympan-surface on the exterior of the said cylinder.

I will proceed to describe my improvement with reference to the accompanying drawings, and afterward point out its novelty in claims.

Figure 1 is a side view of the two impression-cylinders of a perfecting printing-machine, part of one of the side frames in which they are supported, and certain of the parts of the mechanism which constitutes my invention. Fig. 1* is a horizontal sectional view of part of the mechanism shown in Fig. 1. Fig. 2 is an elevation, partly in section, taken just behind the second impression-cylinder. Fig. 2* is an inner side view of one of the gears shown in Fig. 2 and a spring applied thereto. Fig. 3 represents a vertical section of part of the second impression-cylinder, taken parallel with the axis thereof, and a back view of a portion of the tympan-shifting mechanism. Fig. 4 represents an end view of the second impression-cylinder, showing, also, portions of the tympan-shifting mechanism which are outside of the said cylinder. Fig. 5 is a side view of certain parts of the tympan-shifting mechanism in a different position from that shown in Fig. 4. Fig. 6 is a front view of what is hereinafter termed the "movable switch." Fig. 1 is on a scale one-half of that of the other figures, which are all on the same scale.

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

A is one of the side frames of the machine.

B is the first impression-cylinder, and C the second impression-cylinder, to the latter of which my invention is applied. The shaft C′ of this cylinder C is fitted to bearings in boxes *a*, which are capable of an upward and downward movement in housings on the framing in the usual manner.

The cylinder C is represented as having only one tympan *b*, which consists of a roll of paper nearly as wide as the cylinder and of a length many times what is required to cover that portion of the surface of the cylinder by which the impression is given. One end of this roll is fastened to a roller *c*, which may be termed the "delivery-roller," and the other end is fastened to the roller *d*, which may be termed the "take-up roller," the said rollers being within the cylinder and having their journals fitted to bushings *c′* and *d′* in the cylinder-heads. The roll of paper or tympan *b* is capable of being unrolled from the roller *c* and rolled onto the take-up roller *d*. The tympan *b* runs from the roller *c* to the exterior of the cylinder, as shown at *b′* in Fig. 1, thence over the impression-surface of said cylinder to the other end b^2 of said surface, thence successively around and between two similar rollers *e f*, which may be termed the "feed rollers," and from the roller *f* to the take-up roller *d*, as shown in Fig. 4. The feed-rollers *e f* are, like the rollers *c d*, arranged within the cylinder, and they are fitted to bushings *e′ f′* in the cylinder-heads. The said feed-rollers *e f* are geared together by small spur-gears *e** and *f**, so that both rotate together at the same speed, but in opposite directions.

D is a spur-gear concentric with the cylinder C. This gear is carried by brackets *g*, secured to one of the cylinder-boxes *a*, and as it has no rotary motion, but simply rises and falls with the box *a*, and always remains in the same relation to the cylinder, I will hereinafter speak of it as a "stationary gear." On the stud f^2, (see Figs. 2 and 4,) which constitutes one of the journals of the feed-roller *f*, is loosely fitted a small spur-gear f^3, which gears with the said stationary gear D, and to which is firmly secured one member f^4 of a clutch, the other member f^5 of which is affixed to the said stud f^2. To the last-mentioned clutch member f^5 there is secured a spur-gear f^6, larger than f^3, which gears with a smaller gear d^2 on the take-up roller *d*. The small spur-gear f^3 as it is carried around the stationary gear D by the rotation of the cylin-

der is caused to derive a constant rotary motion upon its own axis; but it is only when the clutch member f^4, attached to it, engages with the clutch member f^5, which is fast upon the feed-roller stud f^2, that any motion is given to the said feed-rollers on their own axes and to the tympan, and this engagement does not take place until it is desired to shift the tympan.

So far as I have at present described the means for carrying out my invention they do not differ from what is described in my Letters Patent No. 425,123, dated April 8, 1890, and are only described for the purpose of explaining the means of throwing the clutch member f^4 into and out of engagement with its mate f^5, which constitutes the most essential part of the present invention. These means consist of what I call a "stationary switch" E E′ and a "movable switch" F F′ F^2 F^4 12 and mechanism for effecting and controlling the movements of the said movable switch. The said switches are shown in Figs. 2, 3, and 4, the movable switch being also shown separately in Figs. 5 and 6.

The stationary switch E E′ consists of an arc-formed piece of metal concentric with and rigidly attached to the outside of the stationary gear D. This switch is represented in Fig. 4 as extended around a considerable portion of the gear D; but it is not necessary for it to extend so far, its operating part being only at or near the point E′. The movable switch F F′ F^2 F^4 12 is also of arc form, and is attached to the gear D at the inner side thereof by means of a pivot F^3. This movable switch may be said to be double, the part F^2 12 behind the pivot F^3 constituting one member and the part F′ F^4 above the said pivot being the other member. The disengagement of the gear f^3 and its attached clutch member f^4 from the other clutch member f^5, which is affixed to the feed-roller stud f^2, is effected by a cheek or flange f^7 on the outer side of the said gear f^3 being brought by the revolution of the said gear with the cylinder against the beveled or rounded lower or rear end E of the stationary switch. The engagement of the said gear f^3 and clutch member f^4 is produced by a cheek or flange f^8 on the inner side of the said gear f^3 being brought by the said revolution into contact with the oblique face F^4 (see Fig. 6) of the upper member of the movable switch. The movable switch is, however, only brought into the position (shown in dotted outline in Fig. 4) to act upon the cheek or flange f^8 of the gear f^3 at such times as it is necessary to shift the tympan, the said part of the said switch at all other times occupying a position nearer to the center of the cylinder. The movement of the movable switch into and out of its operative position is effected through a toggle connection with a lever G G′. This lever works on a fulcrum g', which is secured in the cylinder journal-box a. The said lever has a long arm G, which extends more than half-way round the cylinder-shaft, and a shorter arm G′, which constitutes one member of a toggle and is connected by a link G^2, which constitutes the other member of the toggle, and pins g^2 g^3 with the movable switch. The toggle-arm G′ has connected with it a rod g^4, which runs through a guide g^5, (see Figs. 3 and 4,) secured in one of the brackets g, by which the stationary gear D is attached to the cylinder-box. Between said guide g^5 and a nut or collar g^6 on the said rod is a coiled spring g^7, which exerts a tendency to straighten the toggle G′ G^2, as shown in Fig. 4, and bring the movable switch to its operative position when the lever G G′ is free from a locking-lever H, by which the said lever G G′ is engaged, as shown in Fig. 5, at all times except when the shifting of the tympan is to be produced. The toggle when straight locks the switch positively in its operative position. The locking-lever H swings upon a pivot h, which is secured in one of the aforesaid brackets g, and its lower end is notched to engage with the free end of the lever G G′, as shown in Fig. 5, the said end being pointed to engage with a notch h' in the locking-lever. The said pointed end is furnished with an antifriction roller g^8, to be operated upon by a cam I, Figs. 3 and 4, bolted, as shown at i in Fig. 3, to the hub of the cylinder C for the purpose of throwing out the said end and producing the flexure of the toggle G′ G^2, by which the movable switch is brought to its inoperative position, in which it is locked by the engagement of the levers G G′ and H, as shown in Fig. 5.

The delivery-roller c is furnished outside of the cylinder C with a ratchet-wheel c^2, to be engaged by teeth j j on the arm J of a pawl-lever J J′, which is fulcrumed on a stud j', secured in the cylinder-head. The other arm J′ of the said pawl-lever has connected with it a rod j^2, which passes through a guide j^3, secured in the cylinder-head, and between said guide and a nut or collar j^4 on the said rod there is coiled upon the said rod a spring j^5, which serves to throw the teeth of the said lever into engagement with the ratchet-wheel c^2.

To the arm J of the pawl-lever there is firmly bolted or secured a sliding piece j^6, which conforms to a circular track D′, which projects from the inner face of the stationary gear D, concentric therewith. This track is not a complete circle, but only extends about two hundred and sixty degrees, being interrupted, as shown at 10 11 in Fig. 4, so that the said sliding piece j^6 may pass from its exterior to its interior, and vice versa. At all times except when the tympan is to be shifted the said sliding piece j^6 remains held outward by the action of the spring j^5 to run on the outside of the track D′, and it passes by the opening 10 11 therein and clear of the end F^2 and adjacent part 12 of the movable switch, which is kept by the flexure of the toggle G′ G^2 in such position (shown in Fig. 5) that there is room for the said slid-

ing piece j^6 to pass between the said end and adjacent part of the switch and the said end 11 of the track; but when the toggle-lever G G′ has been unlocked by the disengagement of the locking-lever D, as shown in Fig. 4, and its toggle G′ G^2 has been straightened by the action of the spring g^7, and the movable switch has been thereby brought to the operative position shown in Fig. 4 the lower member F′ 12 of the said switch constitutes a prolongation of the inner face of the track D′ beyond the end 11 thereof, and the sliding piece j^6 is then carried by its revolution with the cylinder into contact with the said member F′ 12 of the switch, which causes it and the end of the pawl-lever to which it is attached to move inward toward the center of the cylinder and so to produce the disengagement of the said teeth j j of said lever from the ratchet-wheel and leave the delivery-roller free to permit the drawing off of the roll of paper therefrom by the feed-rollers e f. The said sliding piece runs from the part 12 of the lower member of the movable switch into the interior of the track D′, along which it then runs and by which it is caused to hold the pawl-lever disengaged from the ratchet-wheel until it passes the end 10 of the opening in the track and permits the spring j^5 to produce the re-engagement of the pawl-lever with the ratchet-wheel and the locking of the delivery-roller.

It will be understood from the foregoing description that the unlocking of the delivery-roller c from the pawl-lever J and the engagement of the feed-roller e with the gear f^3, through which the latter roller receives its rotory motion for shifting the typman, are both produced and are produced separately and independently of each other through the movable switch F F′ F^2 F^4 12 after the said switch has been moved from its inoperative position shown in Fig. 5 to its operative position shown in Fig. 4, and that this movement of the said switch is produced by the action of the spring g^7 upon the toggle-lever G G′ on the liberation of the said toggle-lever from the locking-lever H. This liberation is produced by the movement of the said lever H when, after the determined number of revolutions of the cylinder, the proper time arrives for shifting the tympan.

I will now describe the means by which the movement of the said lever for the said purpose is effected. The said lever H is connected by a rod h^2 with the arm K of a trip-lever K K′, (see Figs. 1, 2, and 4,) the fulcrum of which consists of a short rock-shaft k, which works in a bearing k' on the framing A. The other arm K′ of the said lever has connected with it a rod k^2, which runs through a fixed guide k^3, secured on the framing. Between this guide and a nut or collar k^* on the said rod k^2 there is coiled upon the said rod a spring k^4, which by its pressure against said nut or collar tends to press the locking-lever H toward the toggle-lever, so that when it is engaged with the latter lever it will keep the movable switch locked in its inoperative position. (Shown in Fig. 5.) The trip-lever K at the proper time for throwing out the locking-lever H and allowing the movable switch to come to its operative position is operated upon for that purpose through the agency of two intermeshing tappet-gears L M, which are both shown in Fig. 1 and of which the one L is also shown in Fig. 2. The said gear L is fast on the cylinder-shaft C′ and drives the gear M, which turns freely on a fixed stud m^3, secured in the framing. The gear M, which I will term the "trip-gear," has a larger number of teeth than L, the number on L being equal to the number of revolutions which the cylinder C is to make before the shifting of the tympan, which is effected during the next revolution. I will suppose, for example, that L has two hundred and fifty-one and M two hundred and fifty-two teeth, it being desired to shift the tympan during every two hundred and fifty-second revolution of the cylinder. Every time the gear L makes a revolution, the gear M lacks one tooth of the full revolution, so that during two hundred and fifty-two revolutions of the gear L the gear M will make only two hundred and fifty-one revolutions. On the gear L is affixed a tappet-tooth l, and on the trip-gear M is a tappet m, which I will call a "trip-tappet," and is fitted to slide radially in a guide m' on the said gear M, and to which is applied a spring m^2, which tends to press it outward. The tappet-tooth, the trip-tappet, and the spring m^2 are shown in Fig. 1*, which represents a section of parts of the gears L M in a plane in which both of their axes are situated. In every two hundred and fifty-second revolution of the said gear L the said tappet-tooth and trip-tappet come together just as they are opposite a tappet-lug 13 on the arm K of the trip-lever K K′, and the tappet-tooth l will push in the trip-tappet far enough to strike the said tappet-lug 13 and push the trip-lever K K′ outward from the center of the cylinder and by that means, through the rod h^2, trip the locking-lever H from the toggle-lever G. During two hundred and fifty-one of every two hundred and fifty-two revolutions of the gear L, the tappet-tooth l does not meet the trip-tappet m, and the spring m^2 keeps the said tappet pushed out so far that its inner end will not reach the tappet-lug 13 on the trip-lever arm K, and therefore it is only in every two hundred and fifty-second revolution of the gear L that the tripping of the locking-lever H, as before described, takes place. The tripping of the lever H is only instantaneous. As soon as the trip-tappet m passes by the lug 13 on the lever K K′, the spring k^4 by its action on the said lever returns the locking-lever H to the position to again re-engage and lock the toggle-lever the next time the point of the tappet-lever arrives at the notch h' of the locking-lever.

Having now described the construction and

separate operations of the several parts of the tympan-shifting mechanism, I will now describe, briefly, the successive operations of the mechanism. When in every two hundred and fifty-second revolution of the cylinder C the locking-lever H is tripped, the spring g^7 at once operates on the toggle-lever G G′ and produces the straightening of the toggle G′ G^2, and by that means the movable switch is brought to the operative position shown in Fig. 4, and immediately after this the sliding piece j^6 on the pawl-lever J is brought by the revolution of the cylinder within the cam-like portion F′ 12 of the said switch, and as the said piece moves along the said portion of the switch it throws the pawl-lever out of engagement with the ratchet-wheel c^2, and so unlocks the delivery-roller *c*. Just as this takes place the inner flange or cheek f^8 of the loose gear f^3 comes in contact with the part F^4 of the switch, and the continued revolution of the cylinder causes the said loose gear f^3 and with it the clutch member f^4 to be moved inward into engagement with the member f^5 of the clutch, which is fast in the journal-stud f^2 of the feed-roller *f*, so that in the further continued revolution of the said gear f^3 with the cylinder and in gear with the stationary gear D the said gear f^3 and with it the feed-roller *f* will be caused to rotate on their own axes. The two feed-rollers *e* and *f*, being geared together by the gears $e^* f^*$, both operate to produce the drawing off from the roller *c* and over the cylinder a clean portion of the tympan *b*, while the soiled portion which they draw from the exterior of the cylinder is taken up by the take-up roller *d*. This shifting of the tympan continues until an entirely clean portion is brought to the exterior of the cylinder, after which the continued revolution of the cylinder brings the cam into operation on the roller g^8 of the toggle-lever and thereby throws the switch to its inoperative position, (shown in Fig. 5,) where it is locked by the locking-lever H until after two hundred and fifty-one more revolutions of the cylinder C have been made. After the shifting of the tympan, as before described, has been completed the cheek or flange f^7 of the gear f^3 is brought against the beveled end E′ of the stationary switch, and the said gear and its clutch member f^4 are thereby moved outward from the clutch member f^5 and feed-roller *f* and disengaged therefrom. At the same time that the disengagement of the gear f^3 from the feed-roller *f* takes place the sliding piece j^6 of the locking-lever J, which has been running inside of the circular track D′, passes the end 10 of the said track and is permitted to move outward, so that the spring j^5 is permitted to throw the pawl-lever into engagement with the ratchet-wheel c^2 and lock the delivery-roller *c*. The sliding piece j^6 will now continue to run outside of the track D′, the movable switch will remain in its inoperative position, the spur-gear f^3 remains disengaged from the feed-roller, and the tympan will remain stationary during two hundred and fifty-one more revolutions of the cylinder C, when the operations of shifting the movable switch, throwing the gear f^3 into engagement and the locking-lever J out of engagement, and the consequent operation of shifting the tympan, as hereinbefore described, will be repeated through the next following revolution.

In order to prevent the stoppage of the roller *c* by the pawl-lever J before the stoppage of the feed-rollers *f* and the consequent tearing of the tympan, the ratchet-wheel c^2 is not rigidly affixed to the said roller *c*, but is fitted loosely to the shaft or journal thereof and is connected therewith by a coiled spring c^3, one end of which is secured to the said shaft or journal and the other end to the ratchet-wheel. This spring, being interposed between the said ratchet-wheel and said roller, permits said roller to turn a short distance after the locking-lever comes into operation on the ratchet, and the spring will serve the purpose of keeping a tension on the tympan.

In order to prevent the tearing of the tympan by the too sudden starting of the feed-rollers *e f* before the liberation of the roller *c* by the pawl-lever, the clutch member f^5 is not affixed rigidly to the stud or journal f^2 of the roller *f*, but is fitted to be capable of turning thereon, and is connected therewith by means of a coiled spring f^9, one end of which is secured to the said clutch member and the other end to a collar f^{10}, which is fast on said stud or journal.

To compensate for the increasing diameter of the roll of soiled tympan-paper on the take-up roller, *d* the gears f^6 and d^2 are so proportioned that they will drive the roller *d* at a surface speed corresponding with or not less than that of *e f;* but the gear d^2 is fitted to the shaft of *d* with a friction-box in its hub, as shown at d^3 d^4 in Fig. 2, so that as the diameter of the roll increases the said gear d^3 may have a backward slip.

I may have herein sometimes mentioned not only the toothed gear D, but the switch-pivot F^3, the toggle-lever fulcrum *g′*, the pawl-lever fulcrum j^5, and the pivot *h* of the locking-lever H as "stationary," using that term to indicate that they are fixed relatively to the axis and mass of the cylinder, though, being attached to the cylinder journal-box *a*, they have a rising-and-falling motion with the cylinder.

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

1. The combination, with the impression-cylinder of a printing-machine, a roller in said cylinder for delivering clean portions of a tympan, a roller in said cylinder for taking up soiled portions of the tympan, a feed-roller in said cylinder for shifting the tympan, a ratchet-wheel on the first-mentioned roller, a pawl for engaging the same, a stationary gear outside of and concentric with

the cylinder, a smaller gear fitted to said feed-roller and gearing with said stationary gear, and a clutch for engaging said smaller gear with the feed-roller and disengaging it therefrom, of two switches outside of the cylinder, one of the said switches being stationary for producing the disengagement of said clutch and the other being double and movable to and from a position for producing the disengagement of said pawl and the engagement of said clutch at intervals of time for operating said feed-roller, substantially as herein described.

2. The combination, with the impression-cylinder of a printing-machine, a roller in said cylinder for delivering clean portions of a tympan, a roller in said cylinder for taking up soiled portions of the tympan, a feed-roller in said cylinder for shifting the tympan, a ratchet-wheel on the first-mentioned roller, a pawl for engaging the same, a stationary gear outside of and concentric with the cylinder, a smaller gear fitted to said feed-roller and gearing with said stationary gear, and a clutch for engaging said smaller gear with the feed-roller and disengaging it therefrom, of a double switch outside of the cylinder, movable to produce separately the disengagement of said pawl and engagement of said clutch, a toggle-lever having a fulcrum stationary in relation to the axis of the cylinder, a toggle connection between said lever and clutch, a spring applied to said toggle-lever to straighten the toggle and bring and hold the switch to its operative position, a cam on the cylinder-shaft for operating on said toggle-lever to bring the switch to an inoperative position, and a locking-lever for locking said toggle-lever to hold the switch to its last-mentioned position, substantially as herein set forth.

3. The combination, with the impression-cylinder of a printing-machine, a feed-roller therein for shifting a tympan, and a clutch on said roller for driving the same, of a switch outside of and stationary in relation to said cylinder, but its ends movable toward and from the center thereof to and from an operative position for producing the engagement of said clutch with said roller, a toggle-lever and a fulcrum therefor having a fixed relation to the axis of said cylinder, a toggle connection between said lever and switch, a spring for applying pressure to the toggle-lever to throw and hold the switch into said operative position, a cam on the cylinder-shaft for operating said toggle-lever to throw the switch out of the said operative position, a locking-lever for locking the said toggle-lever after the action of said cam, and a stationary cam for producing the disengagement of the clutch from the feed-roller, all substantially as and for the purpose herein set forth.

4. The combination, with the impression-cylinder of a printing-machine, a delivery-roller *c*, a take-up roller *d*, a feed-roller *f* in said cylinder for carrying and shifting a tympan, a ratchet-wheel on said delivery-roller, a pawl-lever J engaging therewith, and a clutch on said feed-roller for driving the same, of a double switch having two operative members F^2 12 and F' F^4, one at each end thereof, a fixed pivotal support F^3 for said lever, on opposite sides of which said members are arranged, one of said members being for producing the disengagement of said pawl from said ratchet and the other for producing the engagement of the clutch with the feed-roller, and a stationary cam E E′ for producing the disengagement of the clutch from the latter roller, all substantially as herein set forth.

5. The combination, with the pawl-lever J on the cylinder for locking the delivery-roller and the sliding piece j^6 on said lever, of the stationary interrupted circular track D′, the pivoted switch having a member F^2 12, which is capable of forming a continuation of said track to lead the said sliding piece thereinto for disengaging said lever from said roller and of keeping it disengaged therefrom, and the spring j^5 for producing the re-engagement of said lever, all substantially as herein described.

CALVERT B. COTTRELL.

Witnesses:
FREDK. HAYNES,
GEORGE BARRY.