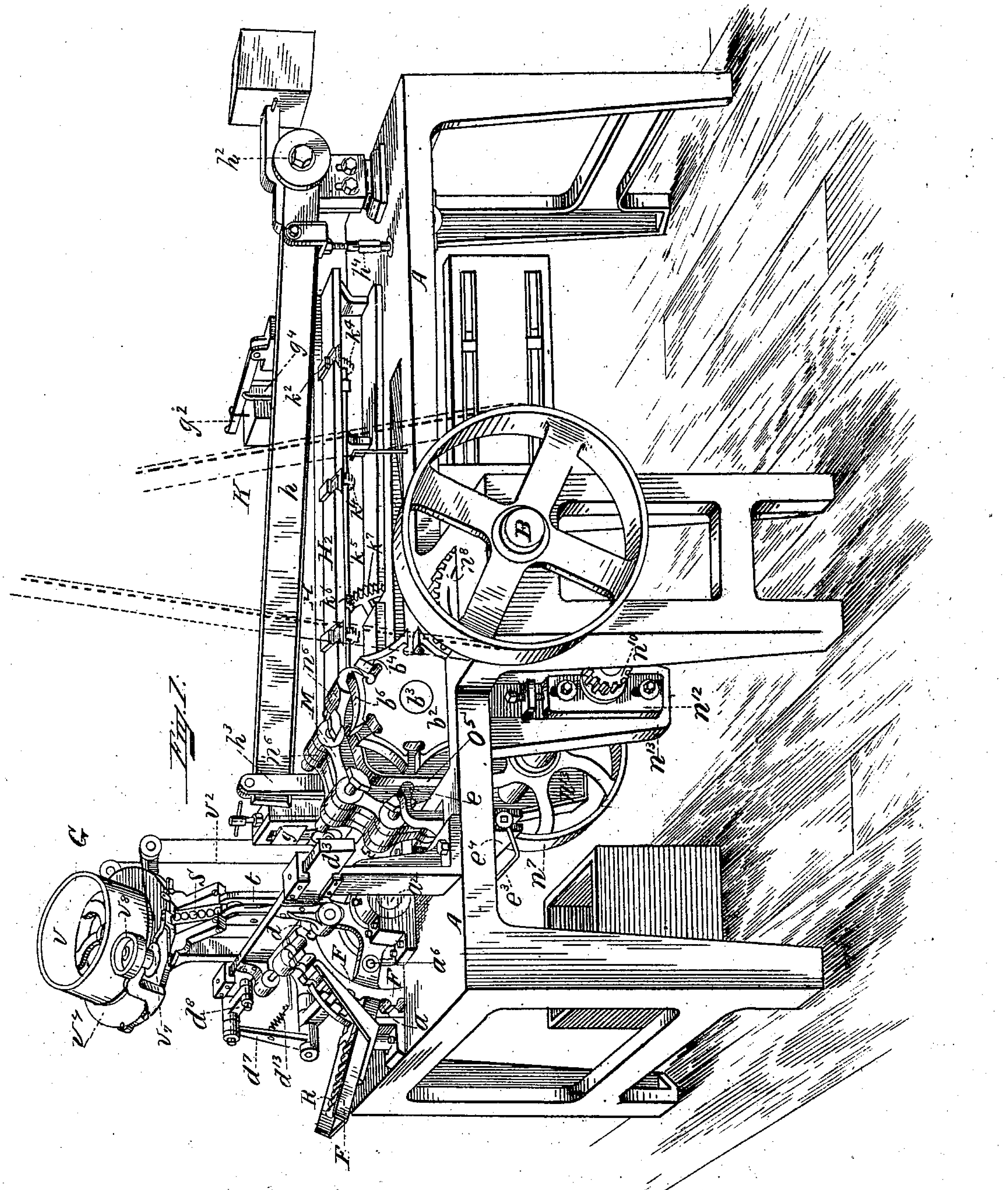
No. 681,298. Patented Aug. 27, 1901.

P. BUTLER.

CARTRIDGE MACHINE.

(Application filed Mar. 13, 1895.)

(No Model.) 9 Sheets—Sheet 1.



Witnesses:
Albert W. David
Jas. B. Russell

Inventor:
Paul Butler

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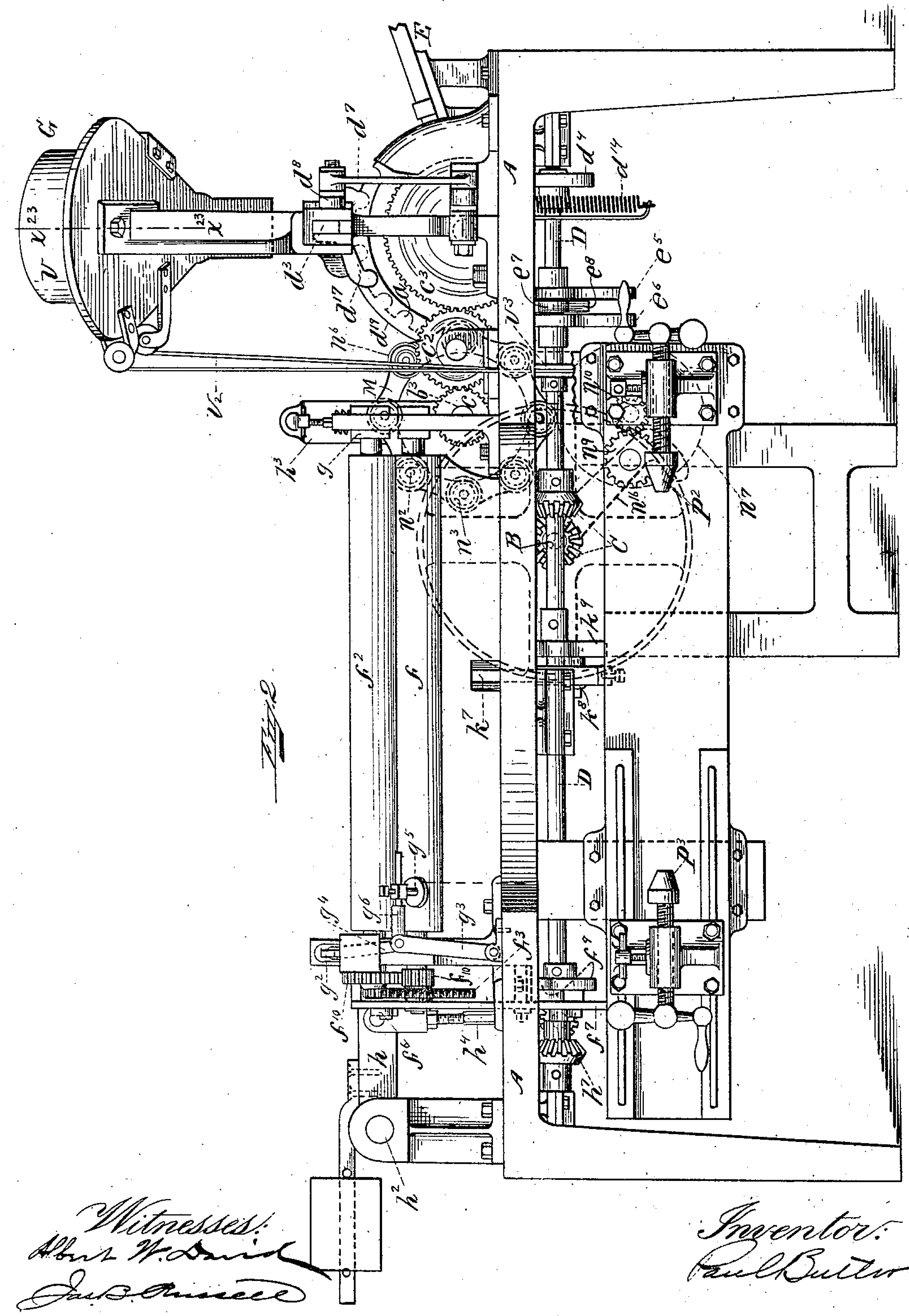

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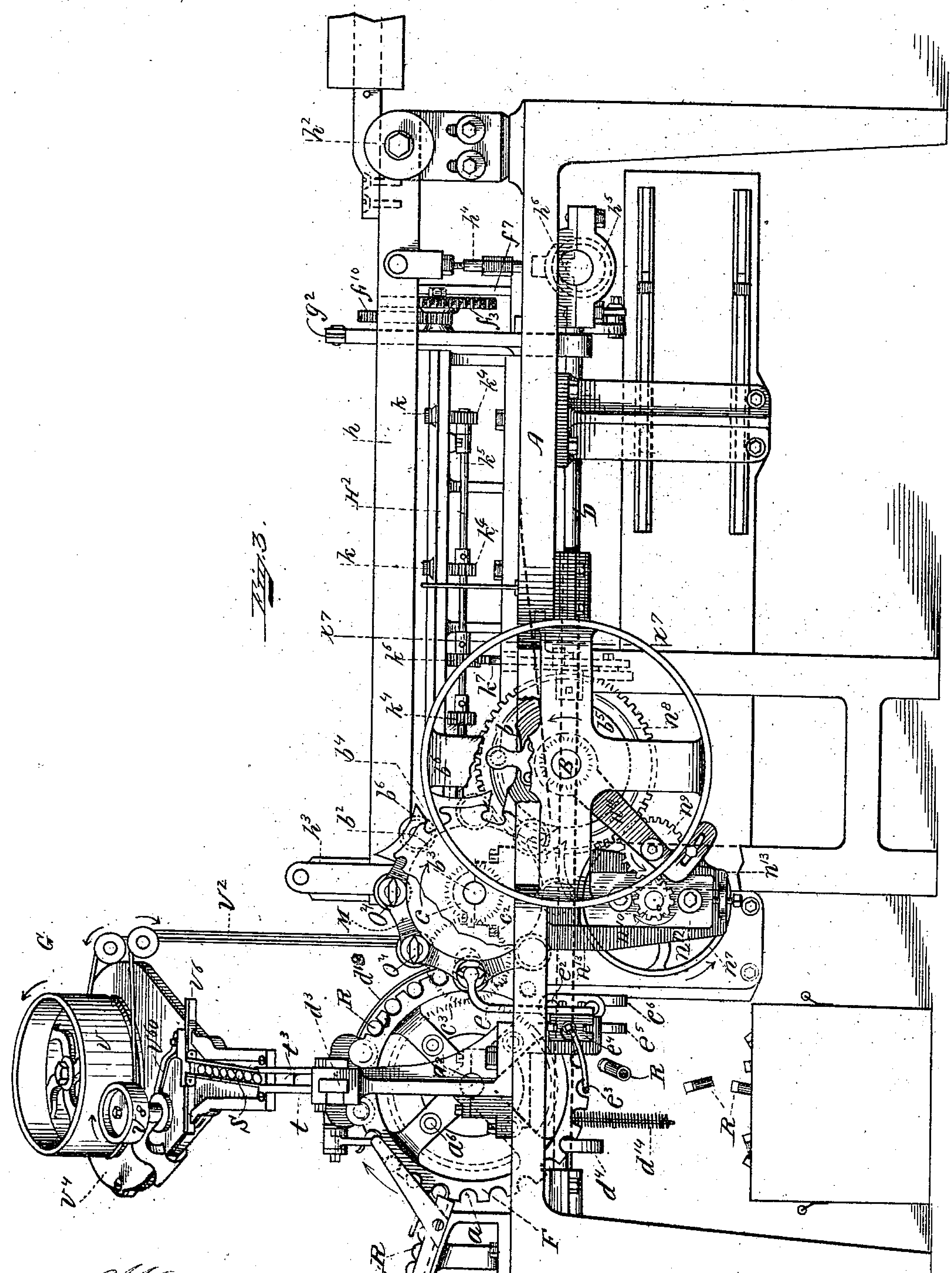

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Jas. B. Russell

Inventor:
Paul Butler

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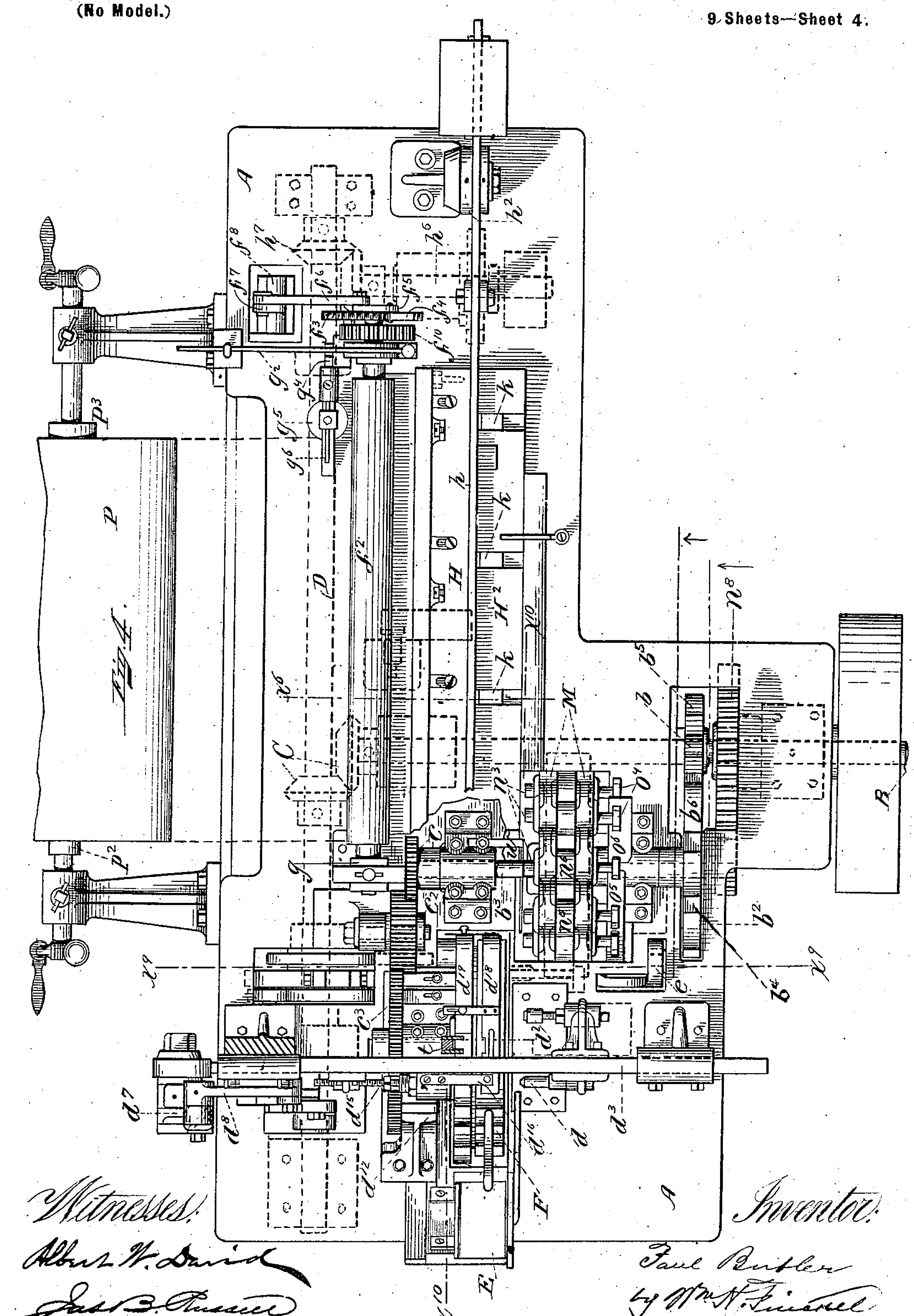

Witnesses:

Albert W. David

Jas. B. Russell

Inventor:

Paul Butler

by Wm. H. Russell

his Atty.

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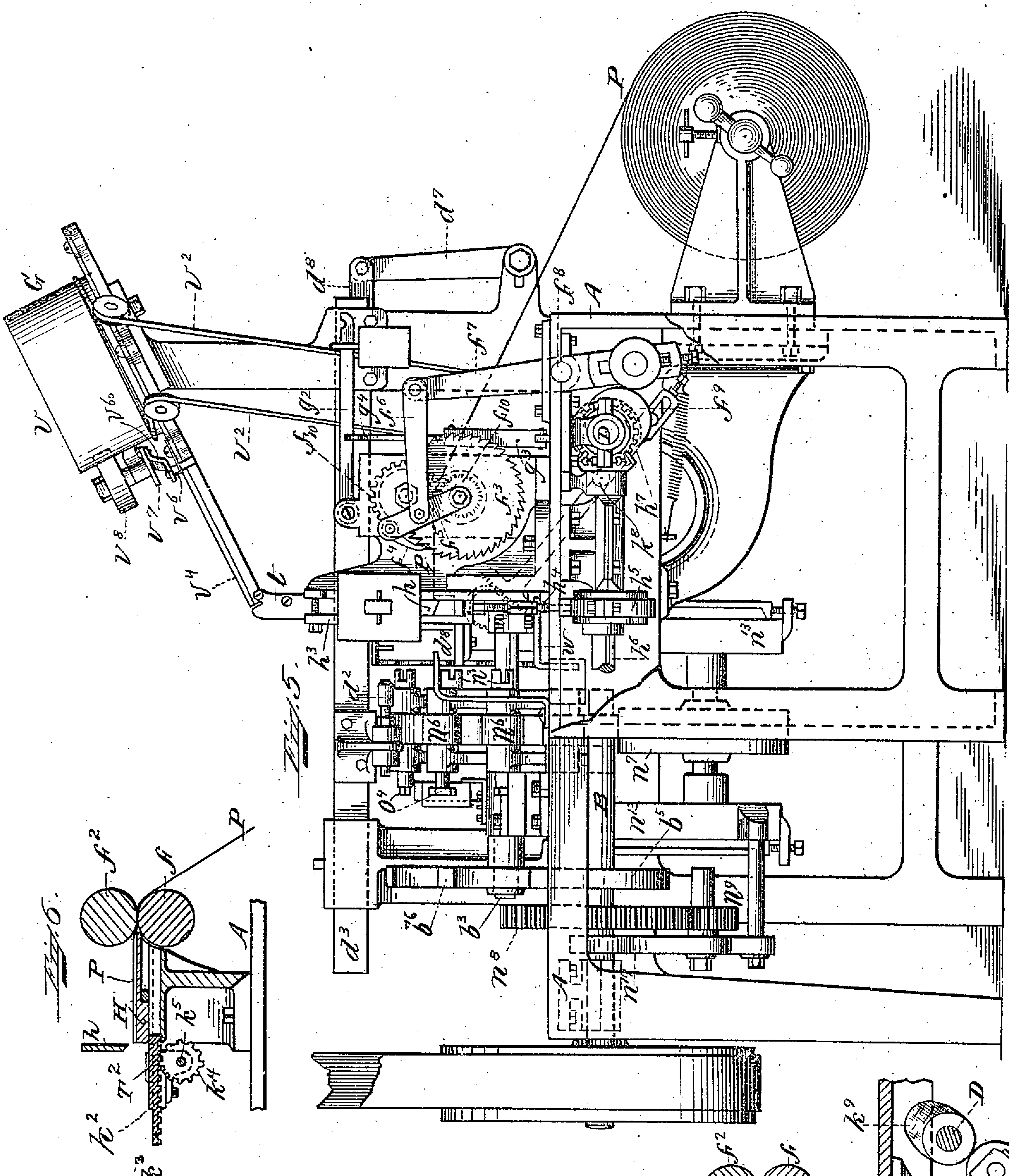

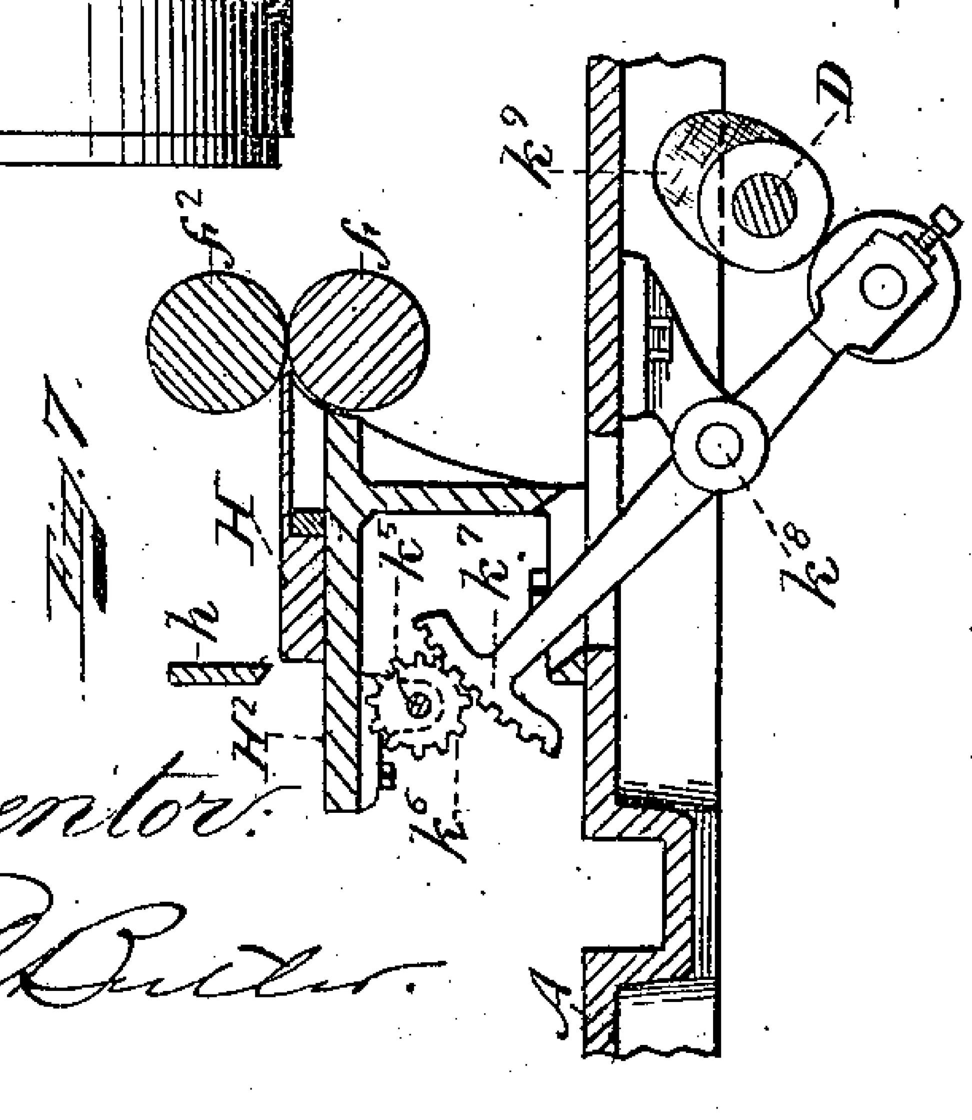

Witnesses:
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Jas. B. Russell

Inventor:
Paul Butler

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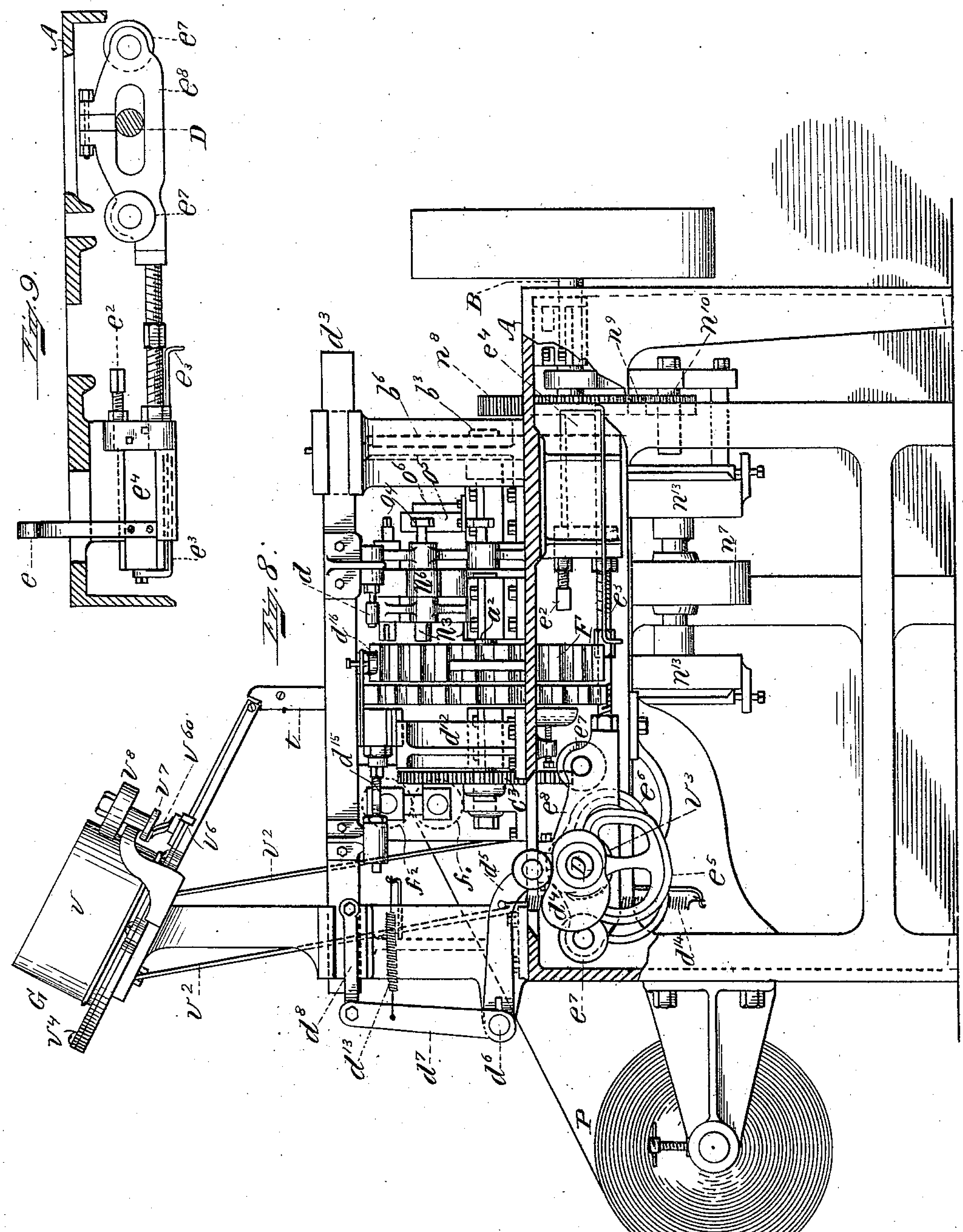
9 Sheets—Sheet 6.



Witnesses:
Albert W. David
Jas. B. Russell

Inventor:
Paul Butler

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(No Model.) 9 Sheets—Sheet 7.

Fig. 10.

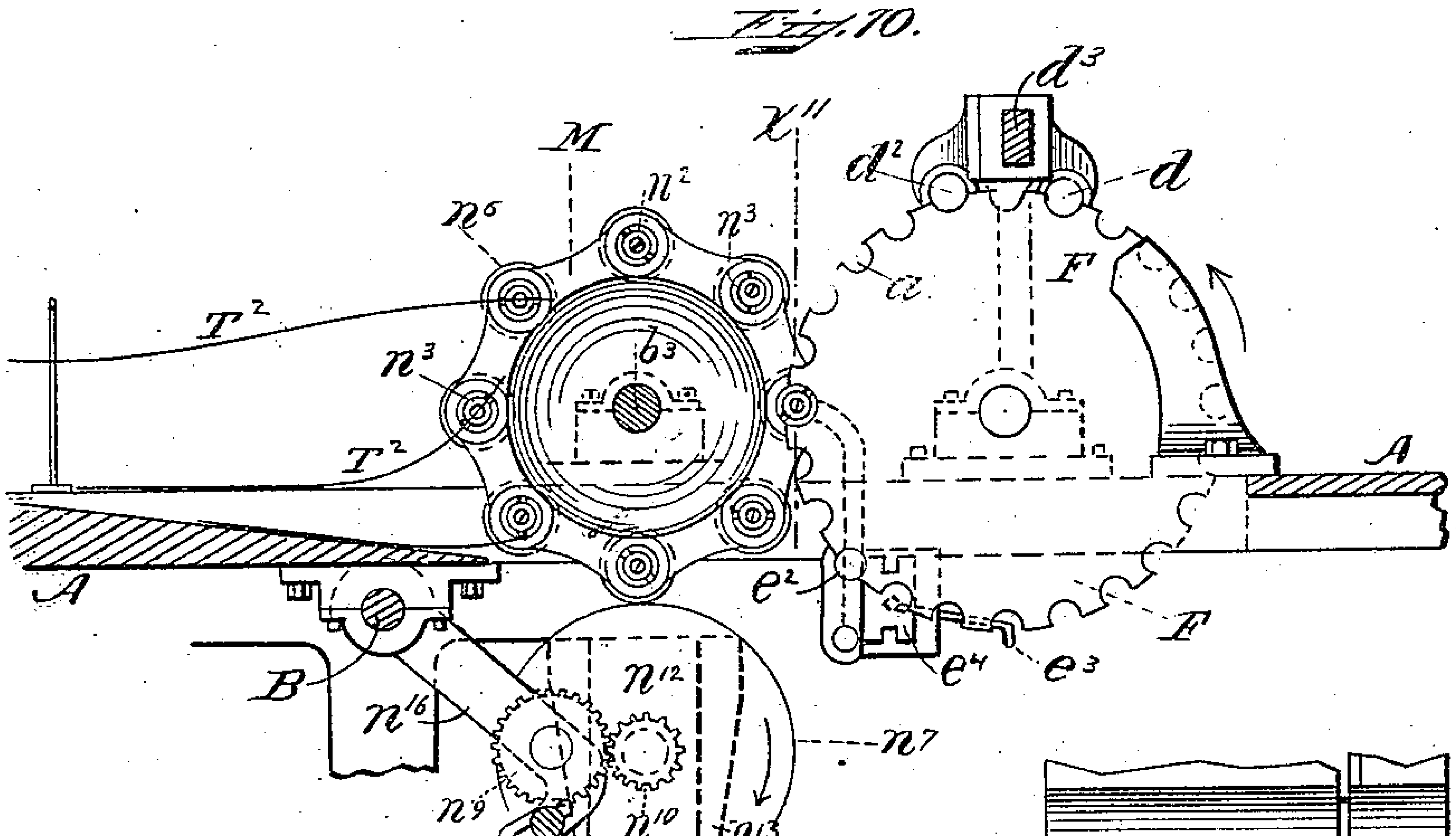


Fig. 11.

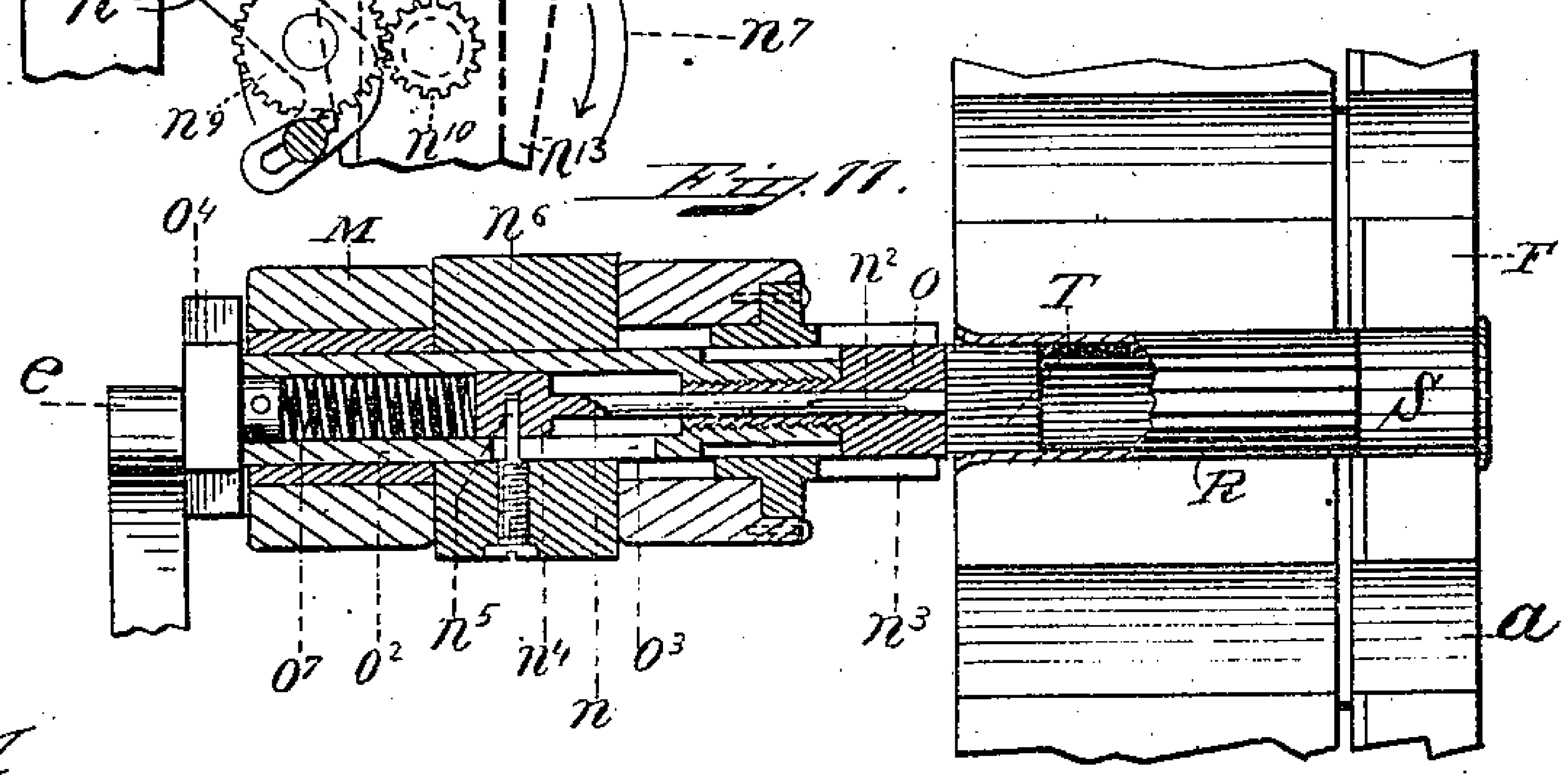


Fig. 14.

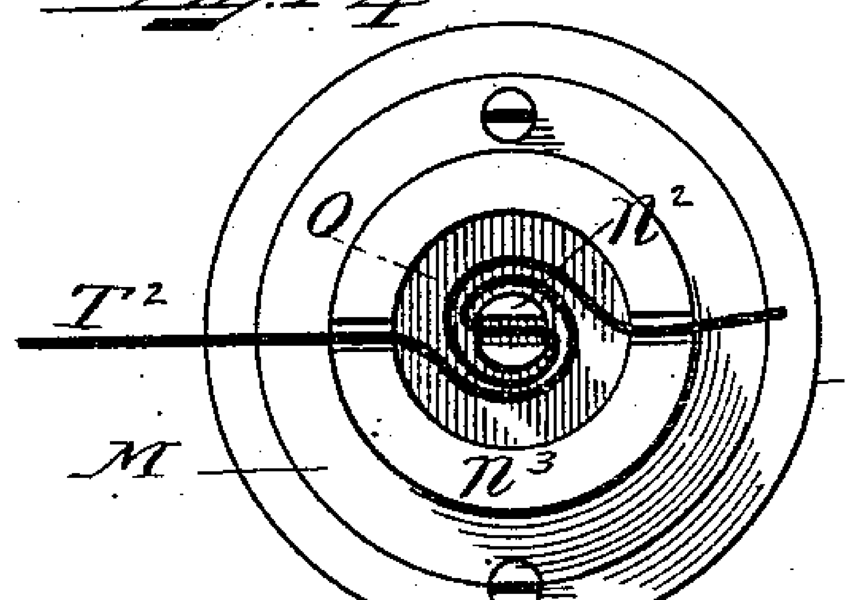


Fig. 13.

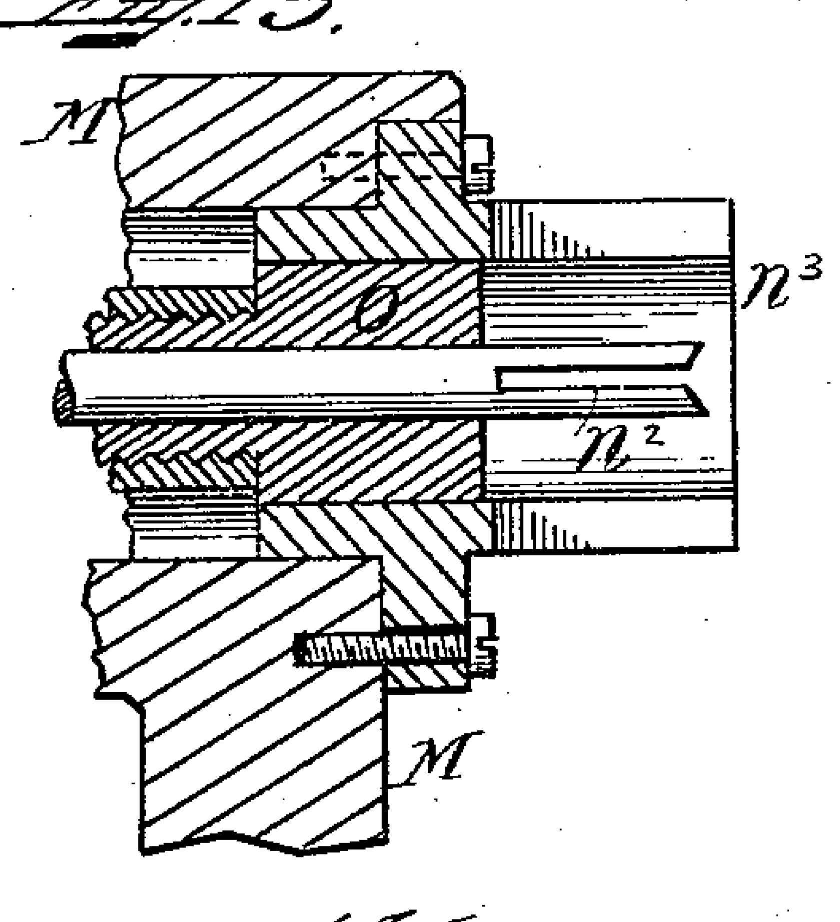
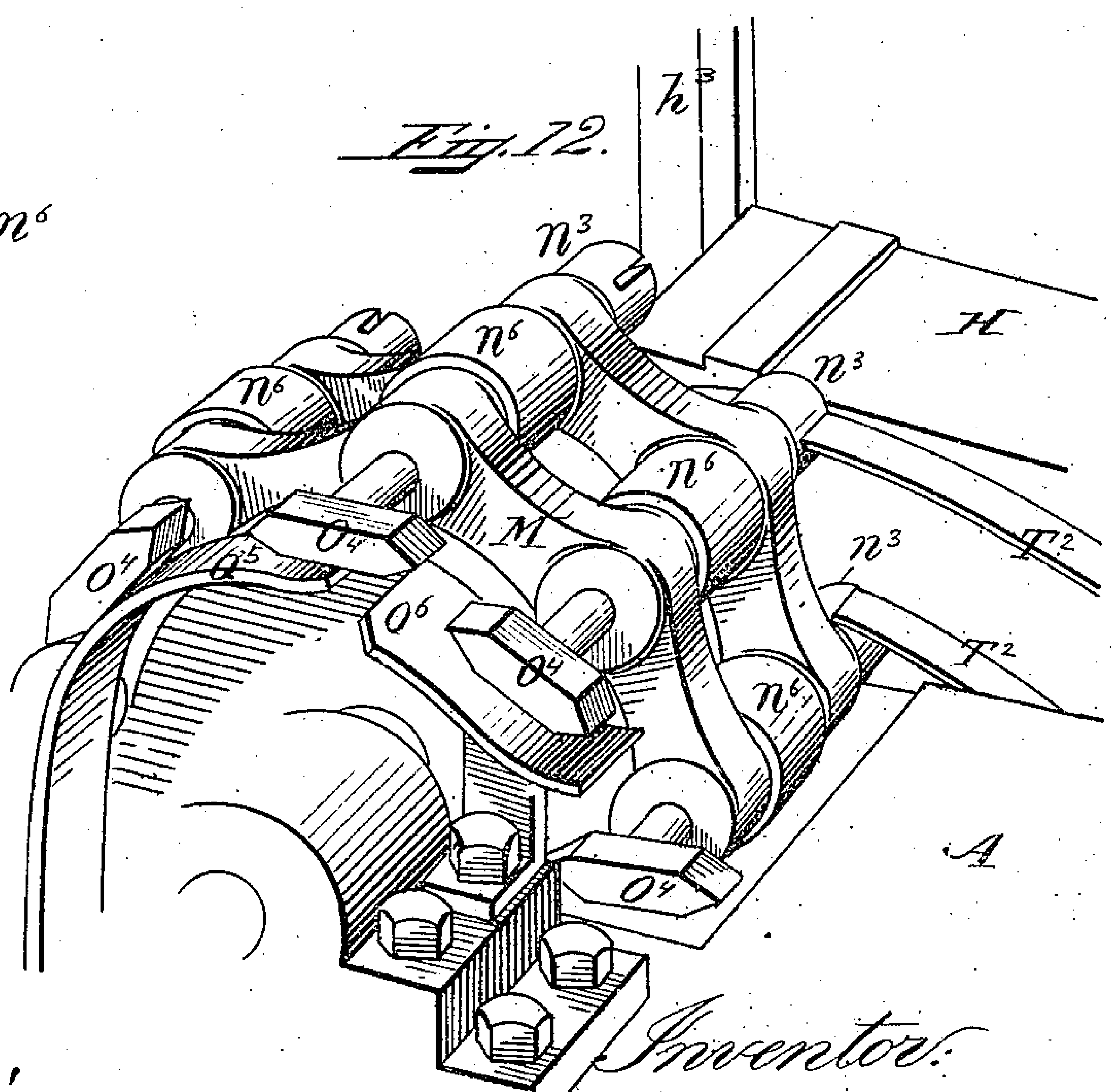


Fig. 12.



Witnesses:
Albert W. Dand
Jas B. Russell

Inventor:
Paul Butler

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Fig. 15

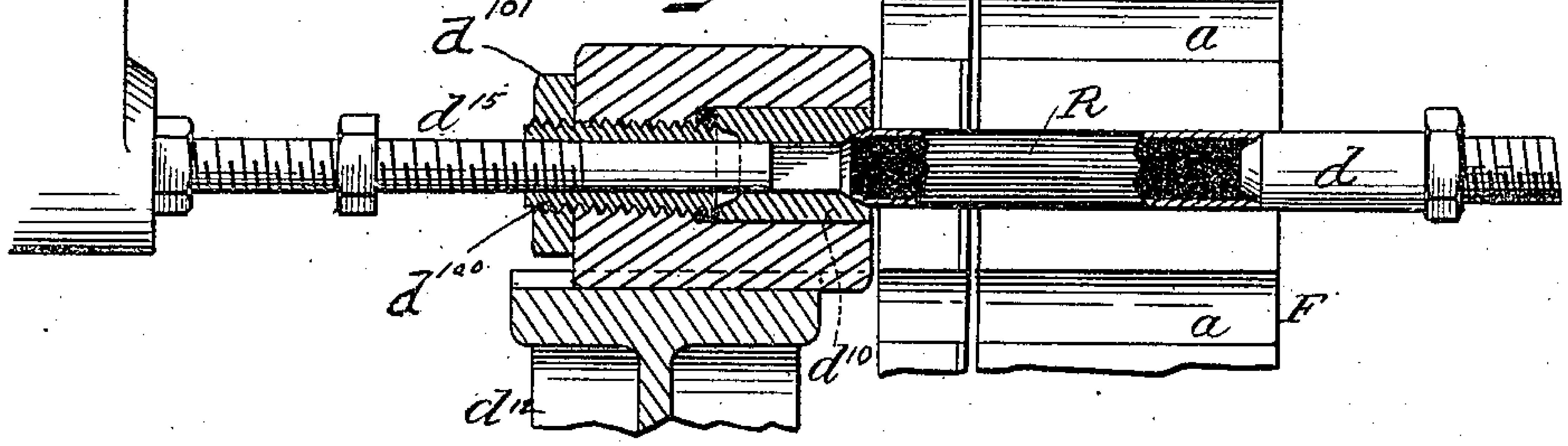


Fig. 16

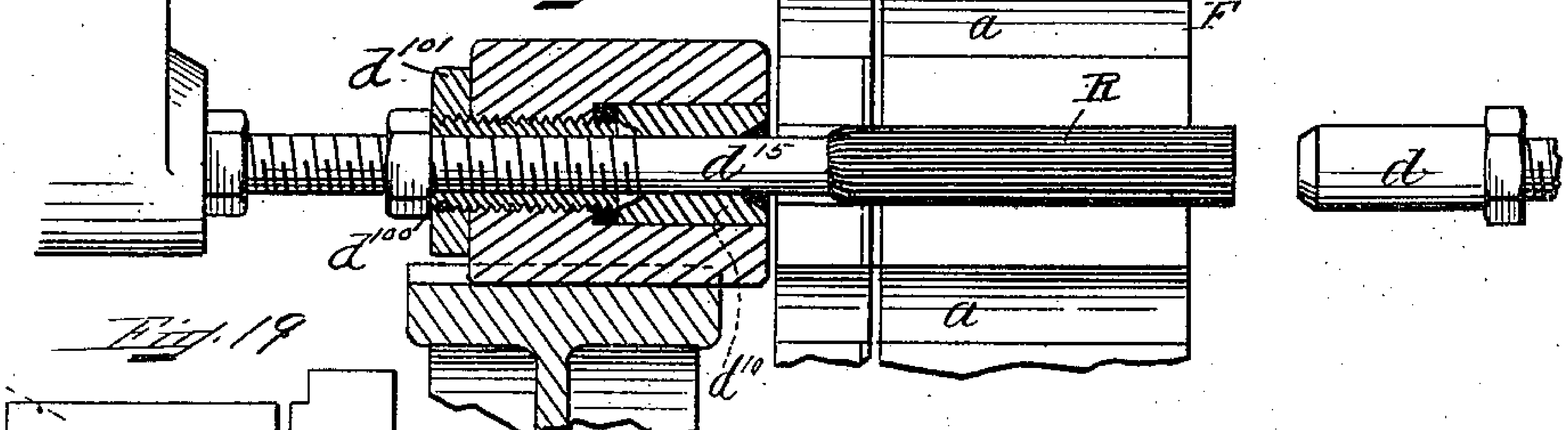


Fig. 19

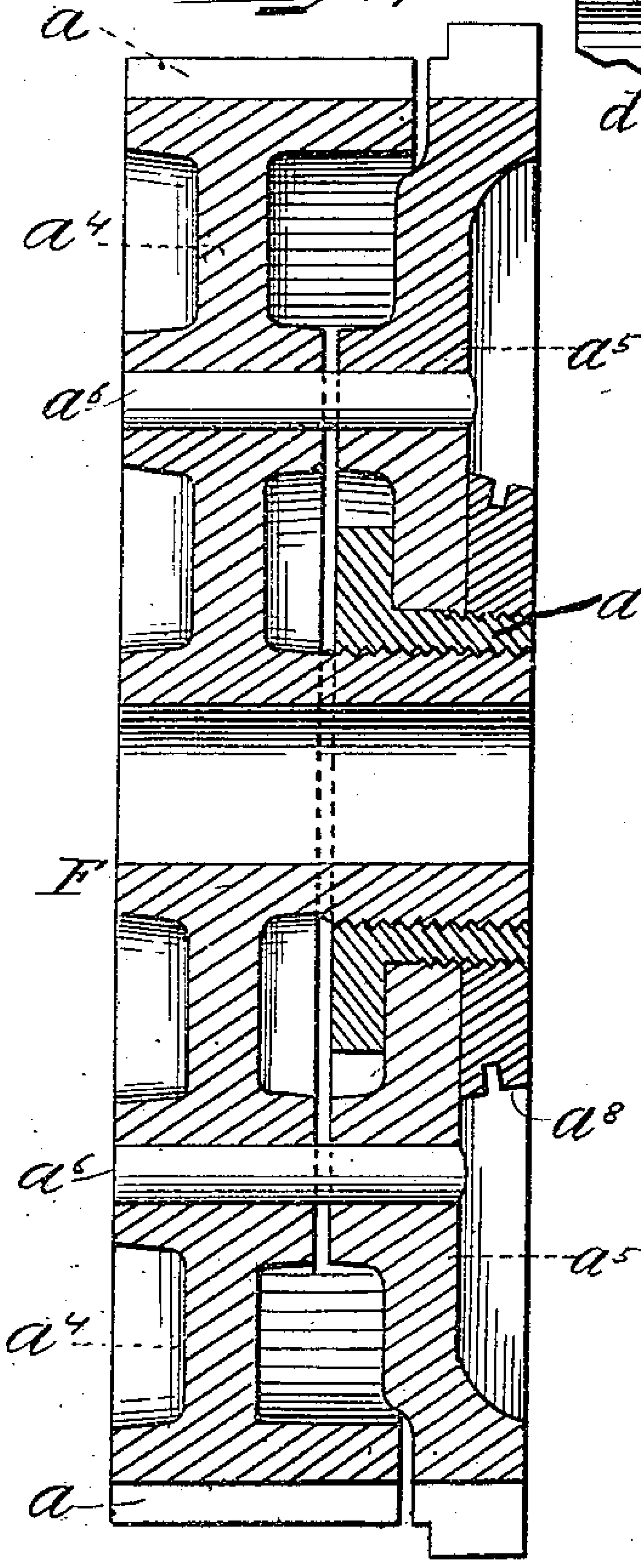


Fig. 17.

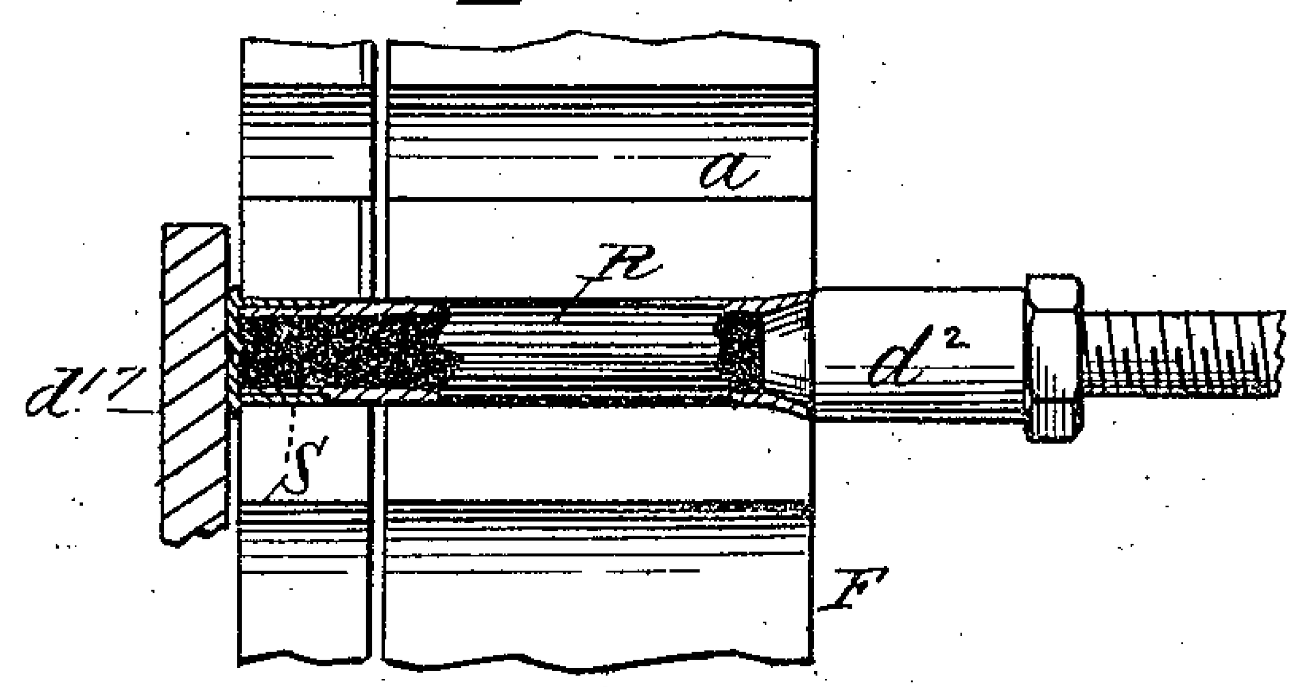
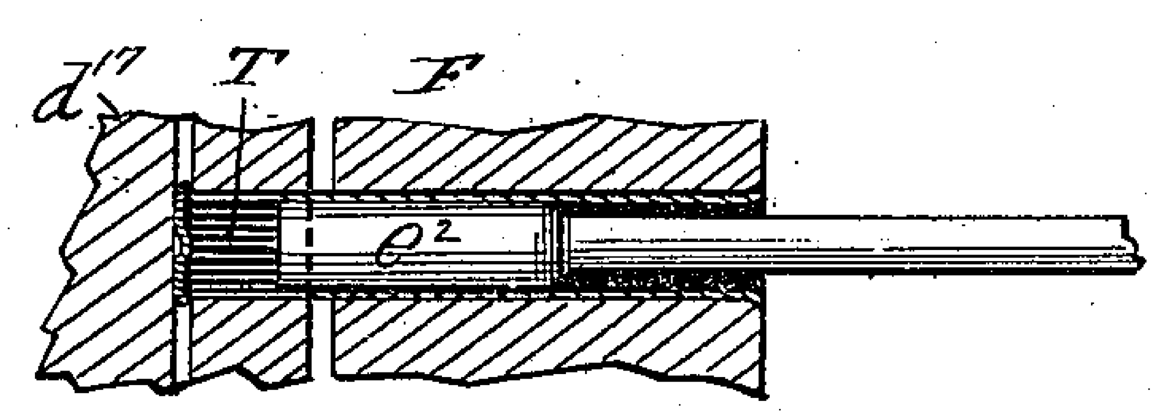


Fig. 18.



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Jas. B. Russell

Inventor.
Paul Butler.

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9 Sheets—Sheet 9.

Fig. 20.

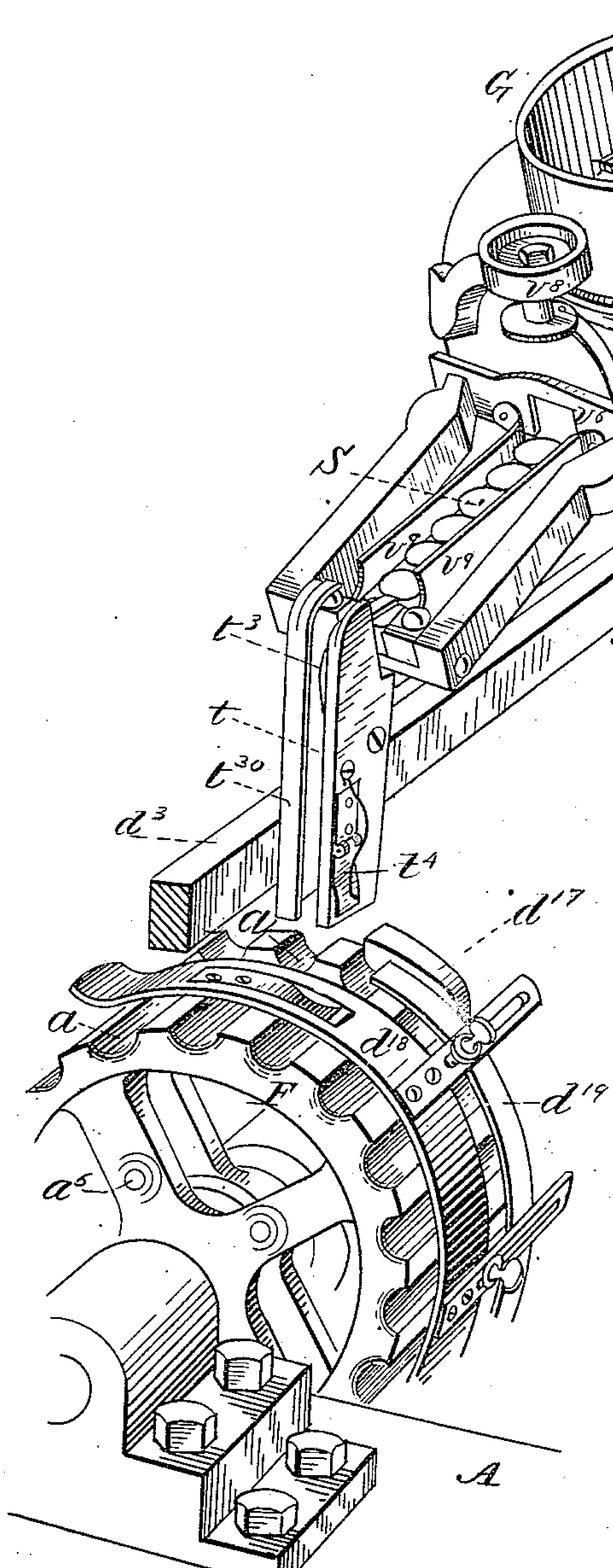


Fig. 21.

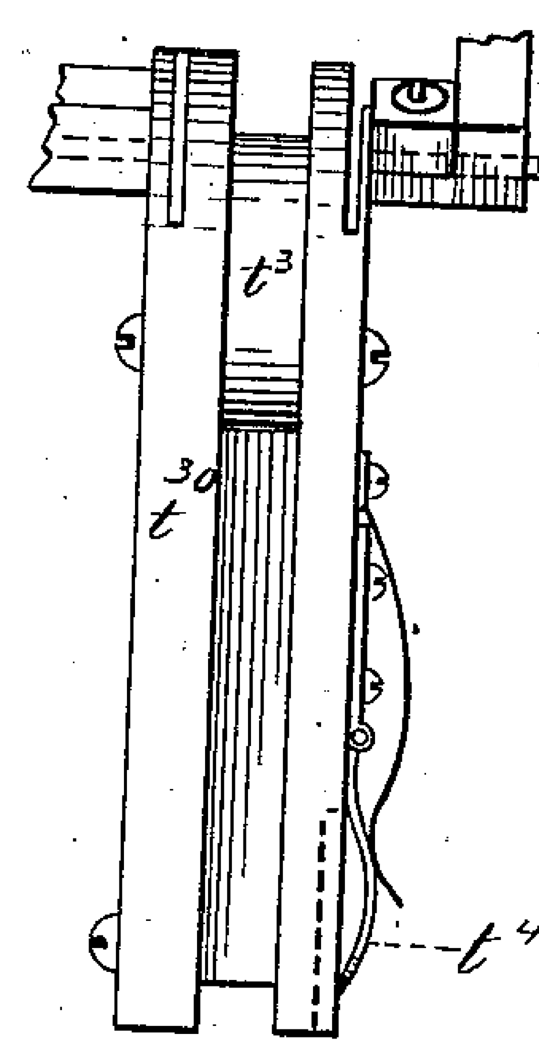


Fig. 22.

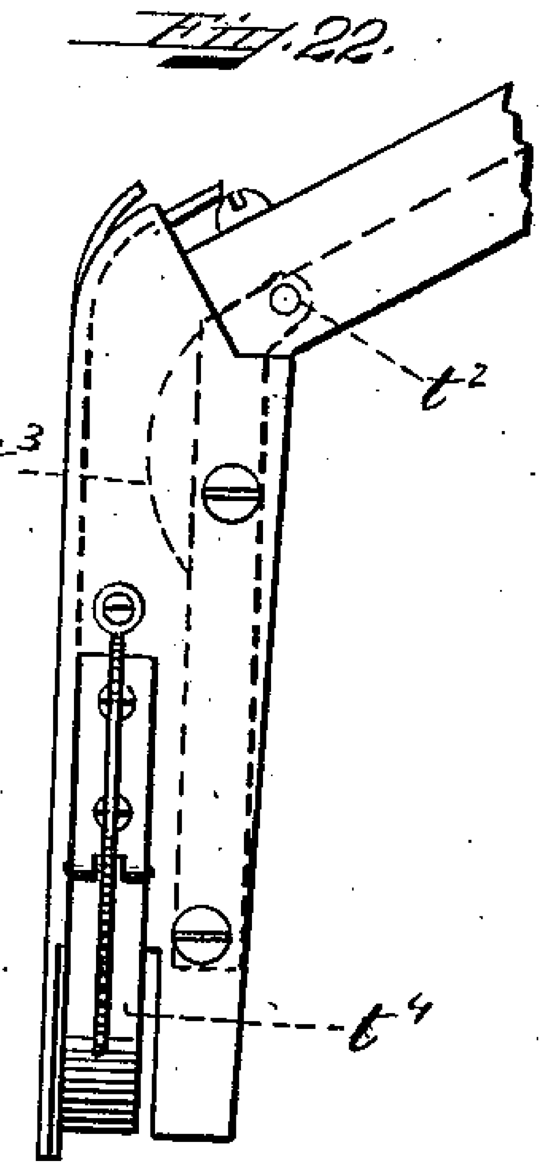
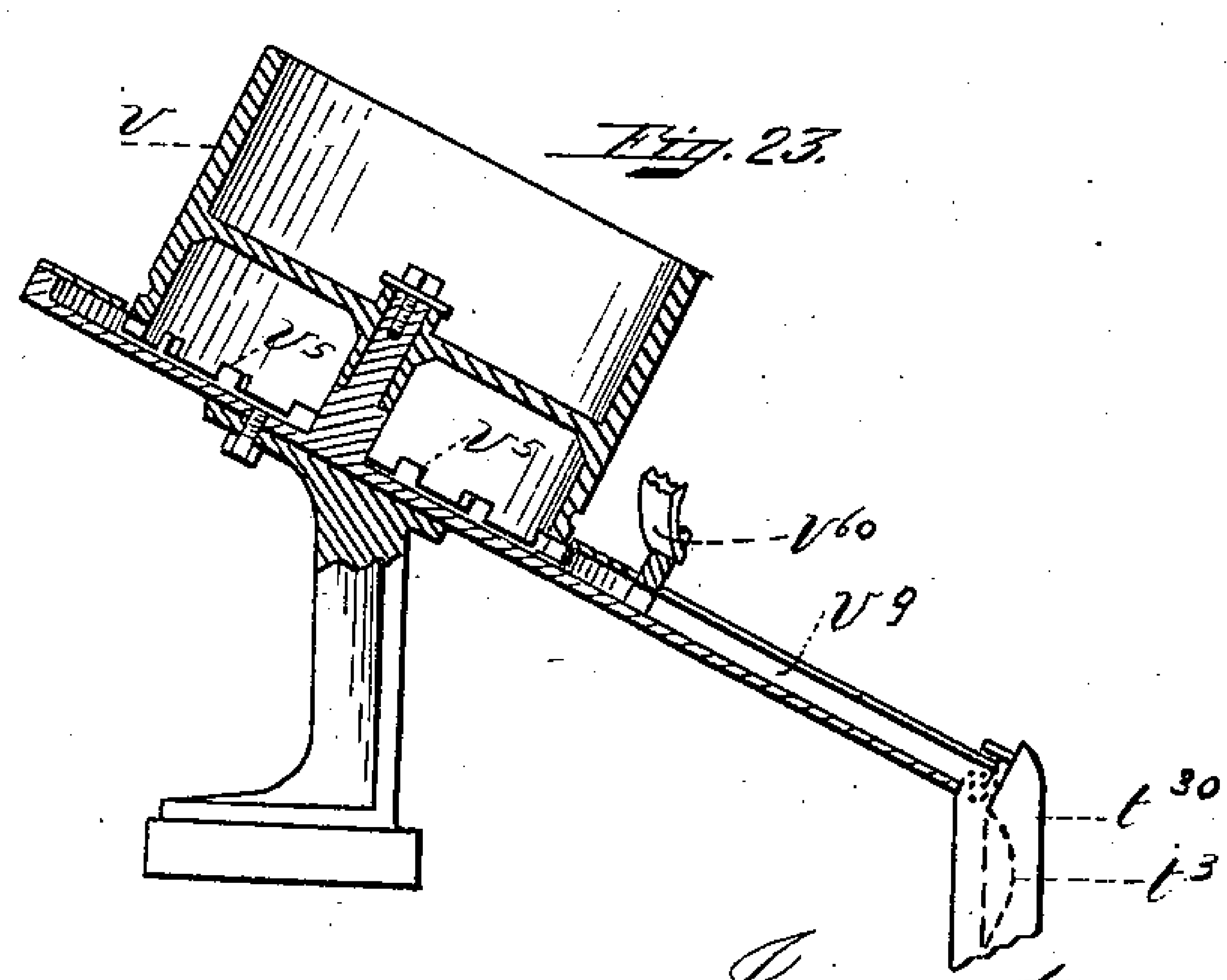


Fig. 23.



Witnesses:
Albert W. David
Jas. B. [illegible]

Inventor:
Paul Butler.

UNITED STATES PATENT OFFICE.

PAUL BUTLER, OF LOWELL, MASSACHUSETTS.

CARTRIDGE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 681,298, dated August 27, 1901.

Application filed March 13, 1895. Serial No. 541,554. (No model.)

To all whom it may concern:

Be it known that I, PAUL BUTLER, of Lowell, county of Middlesex, State of Massachusetts, have invented an Improvement in Cartridge-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention is embodied in a machine for assembling cartridge-shells such as are commonly used in shotguns and consist of a paper tube or body to contain the charge, a metallic base or head, which closes the breech end of the said tube, being cup-shaped, with the sides of the cup surrounding a portion of the end of the tube, and a reinforce or wad, which is driven into the breech end of the tube and compressed therein, so as to strengthen the head and firmly clamp the end of the tubular body between the said wad and the surrounding side wall of the metallic cup. Heretofore in making cartridge-shells of this kind these three parts—namely, the head, the body, and the wad—have been made in separate machines and have been put together or assembled by a series of different operations performed in different machines and involving a large amount of hand labor.

The object of the present invention is to produce a single organized machine wherein all the operations of assembling the cartridge-shells are performed automatically, said machine also automatically producing a wad or reinforce at each operation, which is by the assembling device properly connected with a paper tube or body and metallic base or head, the latter of which parts of the completed shell are made in separate machines and are supplied in mass to the assembling-machine forming the subject of this invention, which machine at each cycle of operations of the combined instrumentalities produces a wad and performs all of the operations necessary to make a wad and to assemble a wad, body, and head, to thereby produce a completely-assembled cartridge-shell. The several operations have to be produced consecutively on some of the parts that are to produce a complete cartridge-shell; but these operations are performed simultaneously in a given complete cycle of movement of the machine on different blanks, so that one blank is having the first operation performed while another, which had the first operation performed in the preceding operation of the machine, is now having the second operation performed, and so on.

To facilitate the understanding of the specific mechanism of the machine, a brief summary will be given of the several operations to be performed and of the general character of the instrumentalities for performing them, it being understood that the invention consists in novel features of construction and operation of these several instrumentalities and in various combinations thereof with one another and with the actuating mechanism therefor, by which the desired results are secured, but is not limited in all cases to the specific arrangement of the instrumentalities and order of operation involved in the machine herein shown as an embodiment of the invention.

It being understood that the paper tubes for the body of the cartridge are made in a separate machine and that the metallic base-pieces are made in a separate machine and are supplied in mass to a suitable hopper or assorting device, which presents them in column in the proper position to be acted upon by the instrumentalities of the machine, the said paper bodies are first received one at a time from a suitable chute or hopper, each in a cavity formed in the periphery of a revolving blank-carrier or wheel having on its periphery a series of such cavities and being actuated with an intermittent movement, so as to rotate the distance between two cavities at each cycle of operation of the machine, it standing still while the operations are performed on the blanks contained in the cavities. These operations include the reducing of one end of the tube, so as to enable it to enter more readily into the head. This is done by suitable dies acting on a blank which has been previously deposited in the cavity of the carrier. Another operation which is performed in conjunction with a blank in a more advanced cavity of the carrier which has already had the reducing operation performed upon it is the thrusting of the reduced end of the tube into the metallic cup or head, which is done by another set of dies, which may be called the "tube inserting or assembling" dies, and at this operation the mouth of the tube is slightly expanded to facilitate the entrance of the wad which has in the meantime been prepared by the wad making and presenting portion of the machine. The wad itself is composed of a narrow strip of paper rolled into a compact coil. This strip is cut from a web of paper the breadth of which is equal to the length required for the strip. The web is intermittingly fed at each operation of the machine a distance equal to the width required for the wad-strip, and a shear or cutter is then operated to cut off such strip, which is then presented by a suitable device to a wad-winder. This operation of cutting and feeding the wad-strip, it is to be understood, takes place at each cycle of operations while the reducing operation is being performed on a tube and the assembling operation on a previously-reduced tube and head. A series of wad-strip winders are supported upon a revolving carrier moved intermittingly and in time with the blank-carrier, before mentioned. The strip-winder by which the strip is wound into a coil to form the wad is a spindle which engages properly with the wad-strip and winds it up into a compact roll or coil, the winding operation taking place at a suitable point in the movement of the wad-carrier from the point where the paper strip is fed thereto to the point where the wad is transferred to the tubular body-blank to be assembled with said tube and head, which in the machine here shown have already been assembled together. At this point the wad-carrier and the blank-carrier are so related that a previously-assembled tube and head in the blank-carrier are in position to receive a previously-wound wad from the wad-carrier, and in the time when the two carriers stop between their intermittent feed movements a transferrer is operated, which transfers the wad from the wad-carrier into the open end of the tube. The assembled head and tube, with the wad thus inserted in the mouth of the latter, are then advanced by the blank-carrier, and at the next and final operation the wad is forced through the tube into the base thereof and compressed in the latter by a punch which may be called the "wad-driving" punch.

Figure 1 is a perspective view of a cartridge-shell-assembling machine embodying this invention, showing mainly the top, right-hand side, and front thereof; Fig. 2, an elevation thereof looking toward the left-hand side of the machine; Fig. 3, an elevation looking toward the right-hand side of the machine, with portions broken away; Fig. 4, a plan view thereof with the head-assorting mechanism removed; Fig. 5, a rear end elevation with a portion of the framework broken away to show the mechanism at the rear; Fig. 6, an enlarged sectional detail on line x^6, Fig. 4; Fig. 7, a sectional detail on line x^7, Fig. 3; Fig. 8, a front end elevation with a portion of the framework broken away to show the working parts at the rear; Fig. 9, a sectional detail on line x^9, Fig. 4, showing in rear elevation the wad-punch, carrier, and parts connected therewith; Fig. 10, a sectional detail on line x^{10}, Fig. 4, showing the wad winding and carrying mechanism and some of the devices coöperating therewith; Fig. 11, an enlarged sectional detail on line x^{11}, Fig. 10, illustrating the operation of transferring the wad from the wad-winder to the other component parts of the cartridge-shell; Fig. 12, a perspective view of a portion of the carrier for the wad-winders and adjacent parts coöperating therewith; Fig. 13, an enlarged longitudinal sectional detail of one of the wad-winding devices; Fig. 14, an end elevation thereof; Figs. 15, 16, 17, and 18, details, on a larger scale, showing the several dies or punches and illustrating the operations thereof on the components of the cartridge-shell; Fig. 19, a section of the blank-carrier; Fig. 20, a detail in perspective of the feed mechanism for supplying the metallic base-pieces or heads; Figs. 21 and 22, front and side elevations, respectively, of the portion of the chute through which the said metallic base-pieces pass from the hopper to the blank-carrier; and Fig. 23, a section of the head-assorter on line x^{23}, Fig. 2.

The general arrangement of the main groups and instrumentalities are best shown in Fig. 1, said parts being supported on a suitable frame A and operated by a main transverse power-shaft B, which connects by beveled gearing C (see Fig. 2) with a longitudinal shaft D, that has the same speed of rotation as the main shaft B.

The cylindrical blanks R to form the body of the cartridge-shell are supplied in a column in the feed-chute E, from which they are taken one at a time by the blank-carrier F, and the metallic base-pieces S are supplied from an assorter G, so as to be fed one at a time to said carrier F, and the strips to form the wads T (see Fig. 11) are cut and fed by the mechanism shown at K, Fig. 1, and the wad-strips are wound and carried to the proper point to be assembled with the previously-assembled body and head portions by the wad winding and carrying mechanism M.

The blank-carrier F, wherein the assembling operations are mainly performed, is in the form of a wheel the periphery of which is provided with a series of transverse pockets or recesses a, said carrier having an intermittent rotary movement by which it advances at each operation a distance equal to the space between two of the recesses a, it standing still during the greater portion of the time of a single rotation of the main driving-shaft B of the machine. The wad-carrier M is also in the form of a wheel having a series of wad-winding devices, which will hereinafter be described, arranged around its periphery, and the said wheel also has an intermittent feed movement in time with that of the blank-carrier of a distance equal to the space between two of the wad-winding devices on its periphery.

The intermittent feed mechanism for the blank-carrier and the wad-carrier is best shown in Fig. 3, and comprises a single tooth or actuating-finger b, carried by the main shaft B and coöperating with a feed-wheel b^2 on the shaft b^3 of the wad-carrier, said feed-wheel b^2 having a series of notches or recesses b^4, spaced to correspond to the desired intermittent feed and adapted to be engaged by the finger b, carried by the main shaft, which thus advances said feed-wheel b^2 the distance between two notches during a small portion of the rotation of the main shaft, which is provided with a stop-disk b^5, coöperating with the concave peripheral sections b^6 of said feed-wheel, so as to lock the same against rotation during the remainder or greater part of each rotation of the main shaft.

The wad-carrier M is fixed to the shaft b^3 of the feed-wheel, and its several wad-winders are spaced to correspond with the notches b^4 of the feed-wheel, so that said wad-carrier is advanced intermittingly with the feed-wheel b^2 once at each rotation of the main shaft B and is held stationary during the greater portion of each rotation of the main shaft. The said shaft b^3 of the feed-wheel is connected by gearing $c\,c^2\,c^3$ with shaft a^2 of the blank-carrier, which thus has an intermittent feed in time with the wad-carrier, but has a larger number of such feed movements to a single rotation, as the blank-recesses on its periphery are more numerous than the wad-winders on the periphery of the wad-carrier. At the end of each intermittent feed movement the said blank-carrier stops with one of its pockets a in a position to receive a paper cylinder or body-blank R from the blank feed chute E and at each intermittent advance carries said blank forward toward the points at which the several consecutive operations are performed thereon, at the same time bringing the next pocket in position to receive another blank, so that a blank is supplied to the blank-carrier at each rotation of the main shaft B. While the blank-carrier is at rest between the two feed operations a blank which has been supplied at a previous period of rest is acted upon by the reducing punch or die d, (see Figs. 8 and 15,) and another blank still farther in advance, which has been reduced at a previous operation by said reducing-punch, is inline with the feed-channel t, (see Fig. 20,) containing a column of the metallic base-pieces S, properly positioned, so that the lowermost one falls into a recess a in the periphery of the feed-wheel, with its open end toward and in line with the previously-reduced end of the body-blank, and a recess farther in advance, which has thus been supplied at previous operations with a reduced body-blank and base-piece, is in line with the assembling punch or die d^2, Figs. 5 and 17, and another recess still farther in advance is in position to receive a wad from the wad-carrier by the action of a transferrer e, and another still farther in advance, containing the assembled body and head and a properly-wound wad transferred into the open end of the body-tube, is in position to be acted upon by the compacting-punch e^2, Figs. 8, 9, and 18, which rams the wad to the base of the shell and compacts it therein, so as to properly unite the three components of the assembled shell. Thus all the operations necessary to supply the blank-carrier with the component parts of the shell and to properly assemble the said component parts may be performed at one time while said blank-carrier is at rest between its two feed movements, it being understood that the said operations are performed substantially simultaneously upon a number of different blanks, while the entire series of operations are performed upon the components of any one shell consecutively, the body-blank being first deposited in the carrier, then at a later operation reduced, then a base-blank deposited in the carrier, then the body and base assembled—*i. e.*, the reduced end of the former thrust into the latter—then a wad supplied, and then said wad compacted in the base of the shell, and, finally, the completely-assembled shell is detached from the blank-carrier by a clearing-finger or ejector e^3, Fig. 8, operated in harmony with the transferrer and compacting-punch. These operations of assembling the components of the cartridge-shell and the means for performing them do not depend necessarily upon the means for producing the wads, which, so far as the operations thus far described are concerned, might be produced in a separate machine and properly fed to the wad-carrier and transferred therefrom to the blank-carrier at the proper time either before or after the assembling of the blank tube and head, and before describing the appliances for producing the wads in an organized machine for assembling the cartridge-blanks the further details of the mechanism for assembling will be described.

From the foregoing description it is evident that it is necessary that the various devices that act upon the blanks or components of the cartridge-sheel at the different stages before described should be actuated during the time that the carrier stands at rest between its feed movements. The mechanism by which this is done is as follows:

The reducing-punch d and the assembling-punch d^2 are both operated simultaneously, being connected with a punch-carrier or slide-bar d^3, working transversely to the plane of rotation of the blank-carrier and actuated by the cam d^4 (see Fig. 8) on the main longitudinal shaft D, said cam acting upon one arm d^5 of an elbow-lever pivoted at d^6 and having its other arm d^7 connected by the link or pitman d^8 with the die-carrier or slide-bar d^3. The actuating-cam d^4 is properly constructed to give the bar d^3 a back-and-forth reciprocation during that portion of the rotation of the main shaft while the blank-carrier stands at rest, and in the forward movement (from right to left in Fig. 8) said dies d d^2 act upon the open or forward ends of the blanks to perform the necessary operations thereon, as will be readily understood from Figs. 15 and 17. In the forward or right-to-left movement of the die-carrier the die or punch d in coöperation with a stationary female die d^{10}, supported on a bracket d^{12} on the framework, reduces or compresses the end of the tubular body of the cartridge-shell, as shown in Fig. 15, and at the reverse or left-to-right movement of the said die-carrier, which is produced by springs d^{13} d^{14}, (see Fig. 8,) an ejector d^{15} pushes the reduced blank out from the female die d^{10}, (see Fig. 16,) depositing it again in the recess of the blank-carrier, by which it is advanced to the position to receive the metallic head of the shell. The movement of the ejector d^{15} is sufficient, as shown in Fig. 16, to push the adjacent end of the blank beyond the adjacent edge of the carrier F a distance equal to the height of the cup or head, so that the latter may drop into the recess of the carrier-wheel past the end of the blank R when the latter arrives at the feed-chute for the head-pieces before arriving at the inserting-punch d^2. After the ejector d^{15} has advanced to the position shown in Fig. 16 it must be withdrawn clear of the recess in the carrier-wheel, so as to permit the feed movement of the latter to take place, and the actuating-cam d^4 is so shaped as to give the extreme forward (or right-to-left, Fig. 8) movement, followed by the extreme backward movement, and then a slight forward movement enough to withdraw the ejector d^{15} from the recess in the feed-wheel, followed by a dwell in which the die-carrier remains stationary and the feed movement of the blank-carrier wheel takes place. A guard-plate d^{16}, supported from the stationary die d^{10}, presses frictionally on the blank and prevents it from being withdrawn from the carrier either by the reducing-punch d or by the action of the ejector d^{15}. The same forward movement of the die-carrier d^3 that caused the reducing-punch d to operate, as has just been described, also causes the inserting punch or die d^2 (which acts in line with a recess of the blank-carrier beyond the head-feeding mechanism G and which has been previously supplied with a reduced blank and head) to insert the said reduced blank into the metallic head, as shown in Fig. 17, the head or base of the cartridge being supported against the thrust of the inserting-punch d^2 by a suitable abutment d^{17}, (see Figs. 4, 18, and 20,) supported on the bracket d^{12} of the framework. The end of the inserting-punch d^2 that enters the tubular blank is made tapering and acts to expand the mouth of the blank slightly, so that the wad will be more readily received therein. Suitable guards are provided for keeping the blanks seated in the pockets in the periphery of the feed-wheel during its feed movement. Two such guards are shown as connected with the feed-chute E, one extending over the periphery of the feed-wheel and the other standing across the ends of the recesses, and similar guards d^{18} d^{19}, (see Fig. 20,) extending from a point near where the assembling-punch acts around the remainder of the periphery of the feed-wheel to the point where the assembled shells are delivered therefrom, act to retain the bodies and head-pieces in the cavities.

While the operations of assembling the tubular body and head preparatory to receiving the wad have been performed by the mechanism thus far described, the wads are themselves prepared, one at each rotation of the main shaft, by the following mechanism, the position of which is shown at K and M, Fig. 1, and the details of which are best shown in Figs. 4, 5, 6, and 7.

The wads are formed from narrow strips cut from a web P of paper supported on suitable pivots P^2 P^3 at the left-hand side of the machine, (see Fig. 2,) the supporting-standard of the latter being adjustable toward and from the former to accommodate webs of different width, the width of the web being what is required for the length of the strip to form a single wad. The said web is intermittingly advanced a distance equal to the width required for the wad-strip by means of feed-rolls f f^2 working in suitable bearings and actuated intermittingly from the longitudinal driving-shaft D by the following mechanism, (best shown in Fig. 5:) A ratchet-wheel f^3, loose on the shaft of the lower feed-roll f, is acted upon by a pawl f^4, operated by a pawl-carrier f^5, which is an arm loosely pivoted on the shaft or axis of the feed-roll f and connected by a link f^6 with a lever f^7, pivoted at f^8 and acted upon by a cam f^9 on said shaft D. The said ratchet is connected by gears f^{10} with the shaft of the upper feed-roll, which is rotated intermittingly at each rotation of the main shaft D and stands at rest in the interval between the feed movements, during which interval a strip is cut off from the end of the web and advanced by the feed-rolls, as will be hereinafter described. In order to insure the proper guidance of the web in its feed movement, the feed-rolls are pressed against the web by a spring-pressed bearing g for the upper feed-roll at the right-hand end thereof, as seen in Fig. 2, while the corresponding bearing at the other end is acted upon by a weighted lever g^2, (see Fig. 5,) the pressure of which is automatically varied as follows: The said lever is partially supported by a pair of loosely-connected links g^3 g^4, Fig. 2, the lower end of the former being pivoted on the framework and the two being of such length that when in line with one another they lift the weighted lever g^2, so as to substantially remove its pressure from the upper feed-roll bearing; but when slightly out of line, as shown in Fig. 2, they permit the said weighted lever to act on the said bearing. In other words, these links g^3 g^4 constitute substantially a toggle joint or lever, which may act to raise the weighted pressure-lever, and are operated to lift the said weight to a greater or less extent by the lateral movement of the joint between the links, which is controlled by the grooved guide wheel or clip g^5, that engages with the edge of the web P and is adjustably mounted on the finger g^6, connected with the joint of the toggle-lever g^3 g^4. Thus if the paper through an uneven feed at the two ends tends to run toward the side where the toggle-joint is located it will tend to straighten said toggle-joint, and thus tend to relieve the pressure of the feed-rolls at that end, causing the rolls to feed more effectively near the other end, and thus to straighten the web, while a reverse deviation of the web from the desired path—that is, a running thereof toward the side away from the toggle-joint—will produce an opposite effect, increasing the pressure of the weighted lever on the adjacent end of the feed-rolls and causing them to feed more effectively, and thus to straighten the movement of the web. The mechanism just described thus constitutes an automatic compensating feed mechanism by which the proper guidance of the paper is controlled by properly regulating the feed to insure the desired movement. If desired, a similar means for varying the pressure of the rolls might be applied at both ends, one tending to increase the pressure, while the other diminishes the pressure at its end; but in practice it is found sufficient to vary the pressure at one end only relative to that at the opposite end, which may remain substantially constant at a suitable mean pressure to insure certainty of feed.

The web of paper after passing through the feed-rolls extends over a support or cutting-table H (see Fig. 4 and sectional detail, Figs. 6 and 7) and projects over the edge of said table, which coöperates with the cutting-shear h, which is a long blade pivoted at h^2 and counterbalanced, as shown in Fig. 3, its free end being supported in a suitable guide h^3, and said cutter being operated at each rotation of the main shaft by means of a link h^4, connected with the cutter-blade and provided with an eccentric-strap encircling an eccentric h^5 on a short transverse shaft h^6, connected by equal beveled gearing h^7 (see Figs. 2 and 5) with the longitudinal shaft D, so that said eccentric makes one rotation and produces one up-and-down vibration of the shear or cutter blade h at each rotation of the main shaft of the machine, thereby cutting a wad strip or blank T^2, Figs. 6, 10, 12, and 14, from the end of the web, said strip being of a length equal to the width of the web and of a width equal to the length of feed movement of the web produced at each intermittent rotary movement of the feed-rolls f f^2, as before described. The wad-strip thus cut falls upon a wad-strip-supporting table H^2, which extends along parallel to the edge of the web, said strip then being in position to be acted upon by the wad-strip-feeding mechanism, consisting of a series of slides k, Fig. 3, working in guides in the said table H^2, said slides having shoulders k^2, Fig. 6, which when the slides are in rearmost position are substantially in line with or at the rear of the line of action of the cutter, so that the wad-strip T^2 when cut falls onto the table H^2 in such a position as to be in front of said shoulders k^2 of the feed-slides when the latter are in rearmost position preparatory to beginning their forward or feeding movement. The said feed-slides are reciprocated back and forth transversely to the table by means of racks k^3, (see Fig. 6,) connected with or formed upon their under surfaces, engaged with pinions k^4 on a shaft k^5, which has an intermittent back-and-forth rotary movement produced by a pinion k^6, (see Fig. 7,) meshing with a toothed sector k^7 on an arm having its bearing at k^8 and being oscillated by a cam k^9 on the main longitudinal shaft D. The feed-slides, as before stated, are in their rearmost position at the time when the cutter descends and are thereafter advanced to present the strip to the wad-winding devices (best shown in Figs. 10 to 14) supported in the periphery of the intermittingly-operated wad-carrier M, before mentioned.

The wad-carrier M is in the form of a wheel the periphery of which is recessed, so as to afford two bearings for the wad-winding spindle n, Fig. 11, which has a rotary movement in said bearings, as will be described hereinafter. The end of said spindle which projects beyond the plane of the side of the wheel is longitudinally slotted or made in the form of a fork n', between the prongs of which the wad-strip T^2 is inserted when advanced by the feeding devices k k^2, before mentioned. The slotted end of said winding-spindle is surrounded by a thimble or wad-chamber n^3, which is fastened to the side of the wad-carrying wheel, so as to have no rotary movement with relation thereto, and is also transversely slotted, as shown, the said wheel being stopped at the end of its intermittent feed movement before mentioned with one of these thimbles with its slot in line with the edge of the table H^2, from which the wad-strip is fed, so that said strip is inserted laterally into the slot of the thimble n^3 and stands with its ends projecting from the sides of said thimble. The rotary movement of the winding-spindle n is so controlled that it also stands with its slot n^2 in line with that of the thimble at the time when the strip is fed, so that the said strip passes laterally into the slot of the spindle as well as into that of the thimble, so that thereafter a rotary movement of said spindle will wind the strip upon it, drawing the end portions of the strip in through the slots of the thimble in so winding the strip, which is of such length that when closely wound upon the spindle it will substantially fill the space between the spindle and thimble. The web of paper and the feed-rolls therefor are preferably mounted transversely to the axis of the wad-winding spindle, so that the strip when cut will fall in the proper position to be laterally inserted in the slot therein by a single movement in one direction. To effect and control the rotary movement of the said spindle n, an independent rotating device is provided therefor and adapted to coöperate therewith after it has been advanced by the carrier. As herein shown, the said spindle n is provided at its inner end with a head or enlargement n^4, (see Fig. 11,) connected by pin or stud n^5 with a pulley n^6, which runs in the space formed in the periphery of the wad-feed wheel and which when rotated will cause the winding-spindle n to be also rotated, and thus to wind the wad-strip around the forked end of the said spindle and into the surrounding thimble. The rotating device proper is herein shown as a friction-wheel n^7, situated at a point in advance of the strip-feeding table in the direction of rotation of the carrier, said wheel being driven by gearing n^8 n^9 n^{10} (see Figs. 3 and 10) from the main shaft B, the periphery of said wheel n^7 engaging with one of the pulleys n^6 at the time when the wad-carrier is stopped at the end of its intermittent feed movement, and thus giving the corresponding winding-spindle rapid rotation, so that the strip is quickly wound into the thimble. The bearings n^{12} of the friction driving-wheel n^7 are vertically adjustable in brackets or pedestals n^{13} by means of set-screws or equivalent devices, as clearly shown in Figs. 1, 2, and 5, in order to enable the said friction-wheel n^7 to engage effectively with the pulleys n^6 of the winding-spindles. The intermediate gear n^9 is mounted upon an adjustable arm n^{16}, as clearly shown in Fig. 3, to enable it to be set properly in relation to the gear n^{10} driven by it in case the latter is adjusted up or down. In order to provide for the ejection of the wad thus wound into the thimble and its transference from the thimble and winding-spindle into the tubular blank of the cartridge-shell of which it is to form a part, the said wad-winding device is provided with an ejecting-plunger o, which substantially fills the annular space between the winding-spindle n and bore of the thimble at the rear of the slotted portions thereof, said plunger o being connected with a tubular spindle o^2, which incloses the head n^4 of the winding-spindle and is slotted, as shown at o^3, for the passage of the stud n^5, that connects the spindle n and its actuating-pulley n^6, the said slot o^3 thus permitting the independent longitudinal movement of the hollow shaft o^2 and ejector o, by which the latter may be forced outward over the slotted portion of the spindle to thus eject the wad from the space between the spindle and thimble and transfer it into the shell in the blank-carrier, which is properly positioned to receive it, as shown in Fig. 11, this transferring operation being performed by the transferrer e, before mentioned. The said ejector-spindle o^2 has the same rotary movement as the winding-spindle n and controls the position thereof when not subjected to the action of the driving-wheel n^7 for the winding-spindle, as follows: The said spindle o^2 is provided with an elongated or cam-shaped head o^4, which, in conjunction with suitable stationary guides o^5 o^6 (see Fig. 12) on the framework, will cause the spindle to be turned whatever amount is required from the position in which it is left by the winding-wheel n^7 to the position in which its slot is in line with that of the thimble when it comes to rest in position to receive the wad-strip. The said guide o^5 is somewhat yielding, so as not to engage too harshly with the cam-head o^4 if it should strike the said guide o^5 in some unfavorable position, and in traveling along the said guide o^5 as the carrier makes its intermediate movement the said cam-head o^4 will be brought to approximately the right position and will leave the end of the yielding cam-plate o^5 in position to run flatwise onto the substantially rigid cam-plate o^6, against which the longer side of the cam-head o^4 rests when the carrier stops with the corresponding spindle in position to receive the wad-strip from the wad-feeding slides k. This turning of the winding-spindle to position it to receive the wad-strip is of course effected by the movement of the entire wad-winding device with the wad-carrier as that is fed from point to point between the successive operations, and at the next movement after the wad-strip has been inserted the cam-head o^4 of the winding device that has just been supplied with a strip in passing off from the stationary cam o^6 has imparted to it a slight rotary movement, which begins the winding of the strip enough to bend it sharply between the slot of the thimble, as shown in Fig. 14, and that of the spindle, so that the latter securely holds the strip until acted upon by the actuating-wheel n^7. This partial initial winding to insure the holding of the strip by the winding-spindle is produced by the edge of the cam o^6, off from which the cam-head o^4 passes, being made springy, and so as to press against the cam-head, which thus receives a sudden rotary impulse as it passes off from the said cam-plate. A spring o^7, (see Fig. 11,) interposed between the head n^4 of the winding-spindle and the cam-head o^4 of the hollow-shaft spindle, tends to keep the ejector in retracted position, but is compressed when the said ejector is operated by the transferrer e, which acts upon one of the wad-winding devices after it has passed beyond the position in which it was operated by the actuating-wheel n^7 and when it arrives at the end of one of its intermittent feed movements and is in line with a recess of the blank-carrier a, that contains the assembled body and head portion as the result of the operations previously described.

The remaining operations are the transference of the wound wad from the winder into the end of the tubular blank in the carrying-wheel, performed by the ejector o, before described, and the transferrer e, and the ramming of said wad to the bottom of the blank and condensing it therein, performed by the punch e^2, as shown in Fig. 18, and the final ejection of the completely-assembled shell from the blank-carrier by the ejector e^3, all of which latter devices are operated simultaneously and act upon the materials at different stages of advance of the blank-carrier, being actuated as follows: These devices are all properly connected with a carrier or slide bar e^4, Figs. 8 and 9, working in suitable guides transversely of the machine and actuated by cams e^5 e^6 (see Fig. 8) on the main longitudinal shaft D, the surfaces of which cams act upon rollers e^7 on a yoke e^8, connected with said slide or carrier e^4. Thus the carrier is reciprocated at each rotation of the main shaft, and in its forward movement (from right to left, Fig. 8) the transferrer e acts on the end of the wad-ejector spindle and causes the latter to eject the wad from the wad-winder and transfer it into the end of the tubular body previously inserted in the metallic head and now supported in a recess in the blank-carrier, as shown in Fig. 11, while at the same time the punch e^2 acts in line with the more advanced recess of the blank-carrier upon a blank into which a wad has been transferred, as just described, at a previous operation of the machine, and drives the same to the base or breech of the cartridge-shell and condenses it there, as shown in Fig. 18, thus completing the assemblage of the cartridge-shell, while at the same operation the ejector or detacher e^3 dislodges a completed shell from its recess in the blank-carrier, so that it falls into a suitable receptacle below.

From the foregoing description it is obvious that the essential features of construction and operation do not depend upon the mechanical details of the mechanism employed, which might be varied widely without departing from the essential characteristics and features of novelty of the machine.

While the main operations of the machine do not depend upon the specific construction of the feed mechanism by which the metallic heads or base portions of the shells are supplied one at a time in proper position to the active instrumentalities of the machine, the said blank-feed mechanism possesses features of novelty and is constructed as follows, (see Figs. 20 to 23:)

The mass of blanks is placed in a cylindrical drum or hopper v, which is rotated to agitate the mass of blanks by means of a belt v^2, driven by a pulley v^3 on the main shaft D. (See Fig. 2.) The said cylindrical hopper is placed in inclined position, as shown, and surmounts a flat chamber v^4 of sufficient height to receive the metallic cups when resting on their closed ends. The hopper-drum v is open at its lower end, so that the cups contained therein rest on the plate that constitutes the floor of the chamber v^4, and the said drum v is provided at one or more points around its lower edge with notches or recesses v^5 (see Fig. 23) of just sufficient width to permit the small or open end of the cup to pass through, but too narrow to permit the passage of the flange at the base or closed end of the cup that coöperates with the extractor of the gun in the finished cartridge. The lower end of the drum is at a sufficient height from the floor of the chamber v^4 to permit the passage of the flange of the cup beneath the edge of the drum, the result being that as the drum rotates in the inclined position shown the cups gravitate toward the lower part of its side wall and tend to fall into the gates or passages v^5 as the latter pass in the rotation of the drum, and any cup that thus presents itself to the passage v^5 while resting with its closed end on the floor will readily pass through the said passage by gravitation, while a cup presented in any other position—as, for example, resting on its open end—will be unable to pass through the opening and will be carried around by the drum until dislodged by collision with other cups in the mass or until carried up far enough to gravitate back with a tumbling movement, by which it is likely to be turned over, so as to rest on its closed end, ready to pass through the next time it encounters one of the openings v^5. Thus the cups are gradually assorted from the confused mass and collect in the chamber v^4, around and mainly below the drum, all resting on the floor of the chamber open end up. The edges or side walls of the chamber converge toward its lower end, as clearly shown, thus producing a tendency for the cups to be brought into line as they gravitate toward the lower end of the chamber, which is provided with an outlet leading to the chûte, in which cups are to be brought in column for delivery to the blank-carrier, as before described.

In order to insure the delivery of the cups in line or column, the lower end of the chamber v^4, toward which they converge by gravitation, is of such width that two of the cups cannot be wedged therein, so as to block up the remainder of the mass, and below this opening is a transversely-sliding gate-piece v^6, having an opening of sufficient size to allow a single cup to pass through somewhat readily, but too narrow to admit of two cups becoming wedged therein. The said gate-piece is vibrated at a moderate speed across the lower end of the chamber v^4 by means of a link v^{60}, connected with a wrist-pin v^7, rotated from the drum or hopper v by a friction-wheel v^8, that bears against the surface of said hopper. The mass of cups in the chamber v^4 tend to gravitate against the gate v^6, and the movement of the latter insures sufficient agitation of the cups resting against it to insure their passing through the opening in the said gate, which in its traversing movement will almost certainly come in line with some cup bearing against the gate, so that the said cup will pass through into the chute below, the floor of which is continuous with the floor of the chamber v^4 and hopper v. In order that the vibratory movement of the gate v^6 may not throw the cups that pass through it out of line and in order to insure the bringing of the cups into a single line, as well as to increase their tendency to slide by gravity down the floor of the chute below the gate v^6, the side walls v^9 of the chute or guideway onto which the blanks pass after emerging from the gate v^6 are connected at their upper ends to the said gate, and thus partake of its vibratory movement, the said side walls being confined against lateral movement at their lower ends, being either pivoted or made fast and sufficiently yielding to provide for the vibratory movement of their upper ends. Thus the cups are all brought into line as they arrive at the lower end of the inclined chute and pass therefrom into the vertical chute that leads down to the blank-carrier wheel F. The lower portion t of the said guide, which leads directly to the feed-wheel, is connected with the upper portion by a hinge-joint, as shown at t^2, for the purpose of enabling the said bottom portion to be adjusted with relation to the side portions to deliver base-pieces of different size to the blank-feed wheel as may be required for different sizes and styles of cartridge-shells. The floor or portion of the vertical chute t against which the base or closed end of the cup rests is provided at its upper end with a rounded projection t^3, which comes just below the angle between the inclined and vertical portions and enables the blanks to pass smoothly around this angle without clogging or having their position changed. The front t^{30} of the vertical portion of the chute is slotted, as shown, so that the cups at the rear thereof can be seen and can be moved along if at any time it should be necessary, and said front is adjustably connected with the rear or main portion, so that it may be set to accommodate cups of different heights. The said chute terminates at a point the distance of which from the bottom of any given recess is substantially equal to the diameter of a head, so that as the column of blanks in the chute rests upon the periphery of the feed-wheel the lowermost blank is laterally supported by the walls of the chute and prevented from being carried forward by said wheel until one of said recesses comes under the said chute in the intermittent feed of the said feed-wheel. The lowermost shell then drops into said pocket and is carried at the next feed movement away from the chute, just clearing the lower end thereof and leaving the rest of the column supported upon the projecting portion of the periphery of the feed-wheel, between two recesses thereof, until the next recess comes in line, and the blank then lowermost drops therein. In order to prevent damage in case one of the metallic blanks is improperly formed or improperly engaged with the feed-wheel, the side of the chute at which the blank leaves the same in the movement of the feed-wheel is provided with a yielding gate t^4, which opens outward and permits the blank to escape if it becomes clogged or improperly engaged with the feed-wheel.

As a machine of the kind herein shown and described is capable of turning out a very large product, it is desirable to provide for adjustability of parts or interchange of the necessary working parts—such, for example, as the dies, punches, &c.—to enable the machine to be used upon different kinds or sizes of cartridge-shells. Such provision for adjustment is made throughout in the present machine and has in some cases been referred to in describing the working parts. For example, the wad-strip cutting and feeding appliances are adjustable to accommodate webs of different width, thus producing wad-strips of different length, and the feed movement of said web may be adjusted by adjusting the position of the cam-roll in the arm f^7, that actuates the ratchet of the intermittent feed, thus enabling wad-strips of different width to be cut. The thimbles n^3 of the wad-winding devices are detachable from the wad-carrier M, so that thimbles of different size can be used when required—as, for example, when a change is made in the gage of the cartridge-shells being operated upon. The several punches or dies d d^2 e^2 d^{15} are all readily removable, so that others of different size can be substituted when necessary, and the female reducing-die d^{10} is also removable from its supporting-block, as clearly shown in Figs. 15 and 16. The said die d^{10} preferably bears against and is positioned by a bolt d^{100}, provided with a lock-nut d^{101}. The main blank-carrier wheel F is constructed to provide for adjustability in thickness or to accommodate blank-tubes of different length, as is best shown in Fig. 19. The said wheel is made of two parts a^4 a^5, the former of which is keyed or otherwise made fast upon the actuating-shaft and is connected by pins a^6 in the web portion of the wheel with the portion a^5 of the wheel, the said pins connecting the two portions of the wheel for rotary movement, but permitting them to be moved toward or from one another in a direction parallel to the axis of rotation. The web of the portion a^5 of the wheel is engaged with a shouldered nut a^7, that screws upon a threaded portion of the hub of the portion a^4 of the wheel, so that by turning the said nut a^7 along the said hub the portion a^5 of the wheel may be moved laterally with relation to the portion a^4, thus lengthening or shortening the pockets a in the periphery of the wheel. A lock-nut a^8 screws upon an external thread on the nut a^7, so as to clamp the web of the portion a^5 of the wheel between said nut a^8 and the shoulder of the nut a^7, and when the said nut a^8 is tightened it restrains itself and the nut a^7 against rotary movement with relation to the portion a^5 of the wheel, and thus with relation to the portion a^4 of the wheel, and thus locks the parts in adjusted position. If necessary to change the width of the wheel to work on blanks of different length, it is necessary only to loosen the nut a^8 and then turn the nut a^7 until the proper adjustment is reached and then to tighten the nut a^8 again.

While all of the instrumentalities hereinbefore described coöperate in the complete organized machine to perform all desired operations automatically and in proper order, the invention is not limited to the use of said instrumentalities in such complete organized machine, as many of the instrumentalities or subcombinations thereof are novel and capable of being utilized apart from the other instrumentalities. Furthermore, the order of operations is not in all cases essential, it being, for example, immaterial whether the wad is introduced into the tube before or after the latter has been reduced for entrance to the cup or assembled with the cup. The appliances for cutting the wad-strip and making the wads from a web of paper, as herein described, might be employed without the assembling appliances, and, on the other hand, the assembling appliances might be employed without the wad forming and feeding appliances, it being necessary only in such case to supply the feed-chute E with blank-tubes already supplied with wads, as has been done heretofore.

I claim—

1. The combination of the blank-carrier and means for advancing the same, with means for supplying cylindrical blanks and corresponding cup-shaped blanks thereto, at different points in its movement, and dies for reducing the end of the cylindrical blank before it arrives at the point of supply of the cup-shaped blank, and means for subsequently inserting the said reduced cylindrical blank into the cup-shaped blank, and actuating mechanism therefor, substantially as described.

2. The combination of a carrier for the heads and bodies consisting of a wheel having a series of laterally open cavities on its periphery each adapted to hold a head and body independently fed thereto, and an intermittent feed mechanism for said carrier, with means for inserting the body in each cavity into the head in the same cavity at each stationary period of said carrier, substantially as described.

3. The combination with a carrier for the heads and bodies having an intermittent feed and adapted to carry a number of said heads and bodies, of a reducing-die for the inner end of the body, means for inserting said reduced inner end into a corresponding head, an expanding-die for the outer end of the body, and a reciprocating die-carrier adapted to operate during the periods between the intermittent feed movements of said carrier for the heads and bodies, substantially as described.

4. The combination with a carrier for the heads and bodies having an intermittent feed movement, with a reciprocating die-carrier; a stationary reducing-die; a coöperating reducing-die on said die-carrier; and an ejector for removing the reduced body-blank from the stationary die, substantially as described.

5. The combination with a carrier for the blanks comprising a rotatable disk mounted on a horizontal shaft and provided with laterally open recesses on its periphery and having an intermittent feed movement, of a wad-carrier adjacent to said disk and also having an intermittent feed movement around a horizontal axis, whereby the wads are successively brought opposite the ends of the blanks contained in said recesses, and means for transferring the wad from said wad-carrier into the said blank, substantially as described.

6. The combination of the blank-carrier and means for supplying the same with a tubular body, and metallic cup or base-piece, with the wad-carrier and means for transferring the wad from said wad-carrier into the tubular body in the blank-carrier, and a punch for forcing said wad to the base of said tubular body, substantially as described.

7. The combination with a carrier for the heads and bodies, of means for inserting the body in the head, a wad-carrier, and a device for inserting the wad into the body and head thus assembled, as described.

8. The combination of means for assembling the head and body of a cartridge-shell, with a wad-carrier having winding devices for forming wads of strips of paper fed thereto, and an ejector for removing the wads from said winding devices and inserting them into the body portion of the shell, as described.

9. The combination with a carrier for the heads and bodies having an intermittent feed movement, of devices operating at the periods when said carrier is stationary to assemble said heads and bodies, a wad-carrier also having an intermittent feed movement and adapted to carry the wads consecutively to a position in line with one of the bodies in its carrier, and an ejector for disengaging the wad from the wad-carrier and inserting it into the said body, as set forth.

10. The combination with a carrier for the heads and bodies having an intermittent feed movement, of devices operating at the periods when said carrier is stationary to assemble said heads and bodies, a wad-carrier also

having an intermittent feed movement and adapted to carry the wads consecutively to a position in line with one of the bodies in its carrier; an ejector for disengaging the wad from the wad-carrier and inserting it into the said body, and a punch for forcing the wad thus inserted into the base of the tubular body, as described.

11. The combination with a movable carrier for the heads and bodies of a cartridge-shell, of a reducing-die for the inner end of said bodies, an expanding-die and actuator for expanding the mouth or outer ends of said bodies, a wad-carrier and ejector for transferring the wads from said carrier to the shells, and a compressor for compressing the wad in the shell, said devices being arranged to operate substantially simultaneously upon different shells, as set forth.

12. The herein-described blank-carrier comprising a wheel or disk having transverse recesses each adapted to contain a blank or one part thereof, as the body; a hub for said disk having a flanged sleeve screw-threaded and longitudinally adjustable thereon; a supplemental wheel or disk mounted on said sleeve, and having corresponding transverse recesses in line with those of the other wheel also adapted to contain a blank or a portion thereof, as the head; means for preventing independent rotary movement of said wheels, and means for clampin' said sleeve when adjusted, substantially as lescribed.

13. The web-feeding mechanism comprising a pair of feed-rolls; means for pressing the feed-rolls together; and means controlled by the edge of the web for varying the pressure near one end relative to that near the other end of the feed-rolls, substantially as and for the purpose described.

14. The combination of the web-feed rolls with a weighted lever or equivalent for pressing the rolls together near one end thereof, a toggle-joint controlling the pressure of said lever and itself governed by the edge of the web being fed, substantially as and for the purpose described.

15. In a device for feeding a web of paper, consisting of feed-rolls between which said web is fed, the herein-described compensating feeding mechanism consisting of a weight or spring adapted to hold the end of the upper roll in contact with the lower roll, a lever adapted to counteract the force of said weight and relieve the pressure thereof upon said upper roll, and an actuator for said lever in contact with the edge of the web, as and for the purpose described.

16. The combination with a strip-feeding device, of a winding-spindle adapted to receive the strip from said device, an intermittingly-fed carrier for said spindle, a device for giving a rotary impulse to the spindle during the forward movement of the carrier, and means for rotating said spindle while the carrier is stationary to completely wind the strip thereon, substantially as described.

17. The herein-described wad-making mechanism comprising a transversely-slotted thimble, a slotted spindle free to rotate within said thimble, an intermittingly-fed carrier for said thimble, feed mechanism for feeding a strip of paper edgewise into both said slots, a device for giving a momentary rotary impulse to said spindle during the feed movement of said carrier, and means for rotating said spindle while said carrier is stationary, until said strip is completely wound into the thimble, substantially as described.

18. A wad-making device consisting of a series of wad-winders each comprising a slotted spindle provided with a pulley and mounted to rotate within a slotted thimble but normally stationary with relation thereto; a carrier for the said spindles and thimbles; intermittent feed mechanism for the said carrier; and an actuating-wheel at a point to which the said spindles are successively carried by the intermittent movements of the said carrier; said wheel being adapted to engage and rotate the pulley on the slotted spindle, substantially as described.

19. The herein-described wad-making mechanism, comprising a transversely-slotted thimble or cylinder, the bore of which is equal to the diameter of the wad to be made; a spindle also having a transverse slot and within and concentric with said thimble and adapted to rotate therein; an automatic feeding device for feeding a strip of paper edgewise into said slots; a carrier for the wad-making device; means for bringing the slot in the spindle into alinement with that in the thimble when the said wad-making device is in position to have the paper strip fed thereto; and an independent rotating device for said spindle normally disconnected therefrom but adapted to coöperate therewith after the paper strip has been thus fed and the spindle advanced a predetermined distance by said carrier, substantially as described.

20. The herein-described wad-making mechanism comprising a transversely-slotted thimble and winding-spindle also having a transverse slot; and mounted to rotate within said spindle; a carrier for said thimble and spindle having intermittent feed mechanism; a cam-head connected with said spindle, a cam-plate engaging said cam-head when the said carrier has reached a predetermined position, the coöperation of said cam-head and cam-plate thus bringing the slot in the spindle into line with that in the thimble, and feed mechanism for feeding a strip of paper edgewise into said slots, substantially as described.

21. The herein-described wad-making mechanism comprising a transversely-slotted thimble and a winding-spindle also having a transverse slot, and mounted to rotate within said spindle; a carrier for said thimble and spindle having intermittent feed mechanism; a cam-head connected with said spindle, a cam-plate engaging said cam-head when the said carrier has reached a predetermined position,

the coöperation of said cam-head and cam-plate thus bringing the slot in the spindle into line with that in the thimble, feed mechanism for feeding a strip of paper edgewise into said slots, and a secondary engaging portion of the said cam-plate adapted by its engagement with the cam-head to partially rotate the said spindle at the next movement of the said carrier, substantially as described.

22. Wad-making mechanism, which comprises a support for a web of paper; feed-rolls for feeding the said web of paper; a shear substantially parallel to the axis of the web-support to cut a narrow strip from the end of the web; a transversely-slotted thimble or cylinder the bore of which is equal to the diameter of the wad to be made; a spindle within and concentric with said thimble and having a transverse slot to correspond with the slot of the thimble; and means for inserting the strip cut from the end of the web into the slots in said thimble and spindle, substantially as described.

23. The combination of the slotted winding-spindle and means for rotating the same, and the relatively stationary slotted thimble; with feed-rolls for a web of paper of the width required for the length of the strip which is to be wound, said feed-rolls being mounted transversely to the axis of said spindle; a cutter to cut a strip from the paper fed thereto; feeding mechanism adapted to operate upon the strip thus cut for feeding same to said thimble and spindle; a traveling carrier for said thimble and spindle; a cam connected with said spindle; and a cam-plate cooperating therewith during the travel of the carrier for bringing the slot in the spindle into line with that in the thimble, to permit the feed of the paper strip thereto, substantially as described.

24. A wad-making device comprising a wad-winder consisting of a slotted spindle provided with a pulley and mounted to rotate within a slotted thimble but normally stationary with relation thereto; a carrier for said wad-winder; and an independently-driven actuating-wheel adapted at a certain period in the travel of said carrier to engage and rotate the pulley on the said slotted spindle, substantially as described.

25. In combination with devices for assembling the heads and bodies of cartridge-shells, a wad-carrier comprising a thimble or recess for the wad, an ejector for ejecting the wad from said thimble, and feed mechanism, whereby the head and body assembled are positioned to receive the wad when thus ejected, as set forth.

26. The wad-carrier consisting of a disk or wheel having on its periphery a series of thimbles each adapted to hold a wad, and intermittent feed mechanism for said disk, in combination with a carrier for the heads and bodies also having intermittent feed mechanism, and arranged to bring, at each step, one of said bodies into position to receive the wad when ejected from its thimble, and an ejector for thus ejecting the wad, substantially as set forth.

27. The wad-making device consisting of a traveling carrier, a thimble or cup rigid with relation thereto, a spindle within said thimble and concentric therewith, and having a bearing in said carrier, a wheel or roller secured to said spindle for rotating the same in said bearing, an ejector comprising a plunger sleeved upon the said spindle and capable of longitudinal movement with relation thereto, means for preventing independent rotation of said spindle and plunger; a cam connected to said plunger; a cam-plate coöperating therewith to produce a rotary movement of the spindle; and means for pushing said plunger from its normal position behind the thimble into the said thimble, substantially as and for the purpose described.

28. The herein-described feeding device for the heads consisting of a hopper adapted to feed the shells head down into a chamber having an inclined floor, an opening in the wall of said chamber at the lowermost part thereof, a reciprocating gate for said opening having a slot which permits the passage of heads therethrough one only at a time, and walls connected to said gate at the sides of said slot and pivotally connected to the walls of a chute leading to the carrier into which the heads are to be fed, substantially as and for the purpose described.

29. In a machine for assembling cartridge-shells, the combination with an intermittingly-fed carrier for the heads of said shells comprising a rotatable disk having transverse recesses along the periphery thereof, of a vertical chute for said heads extending toward the periphery of said wheel, the lower end of said chute terminating at a point the distance of which from the bottom of any given recess is substantially equal to the diameter of a head, an opening in the side of said chute of such width as to admit the passage therethrough of a head, and a yielding spring-actuated gate adapted to close said opening, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PAUL BUTLER.

Witnesses:
ALBERT W. DAVID,
JAS. B. RUSSELL.