

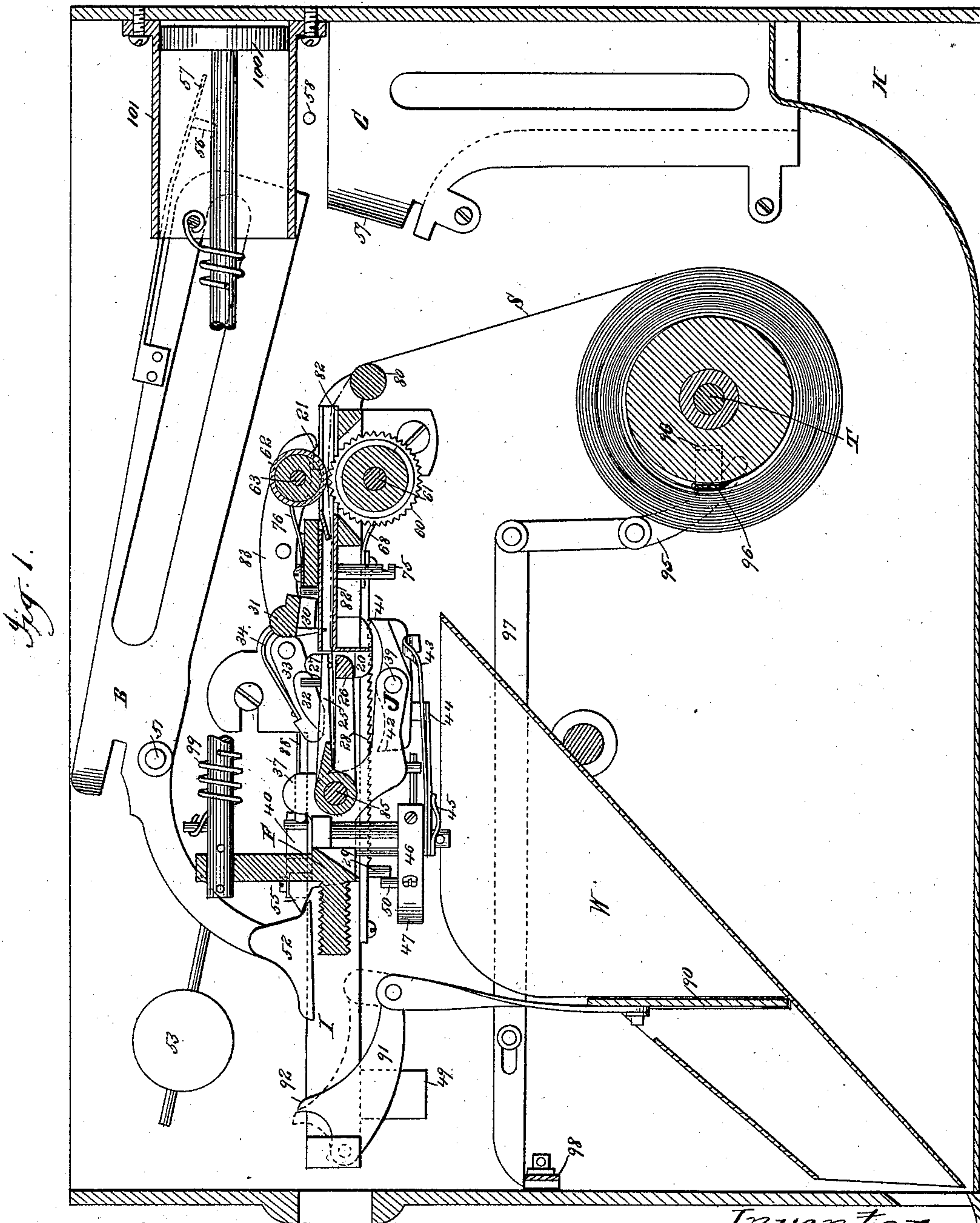
(No Model.)

7 Sheets—Sheet 1.

C. F. DE REDON.
VENDING APPARATUS.

No. 406,634.

Patented July 9, 1889.



Attest:
Geo. H. Potts
J. Kennedy

Inventor
Constant F. de Redon
by Philip Phelps Hovey
Atty.

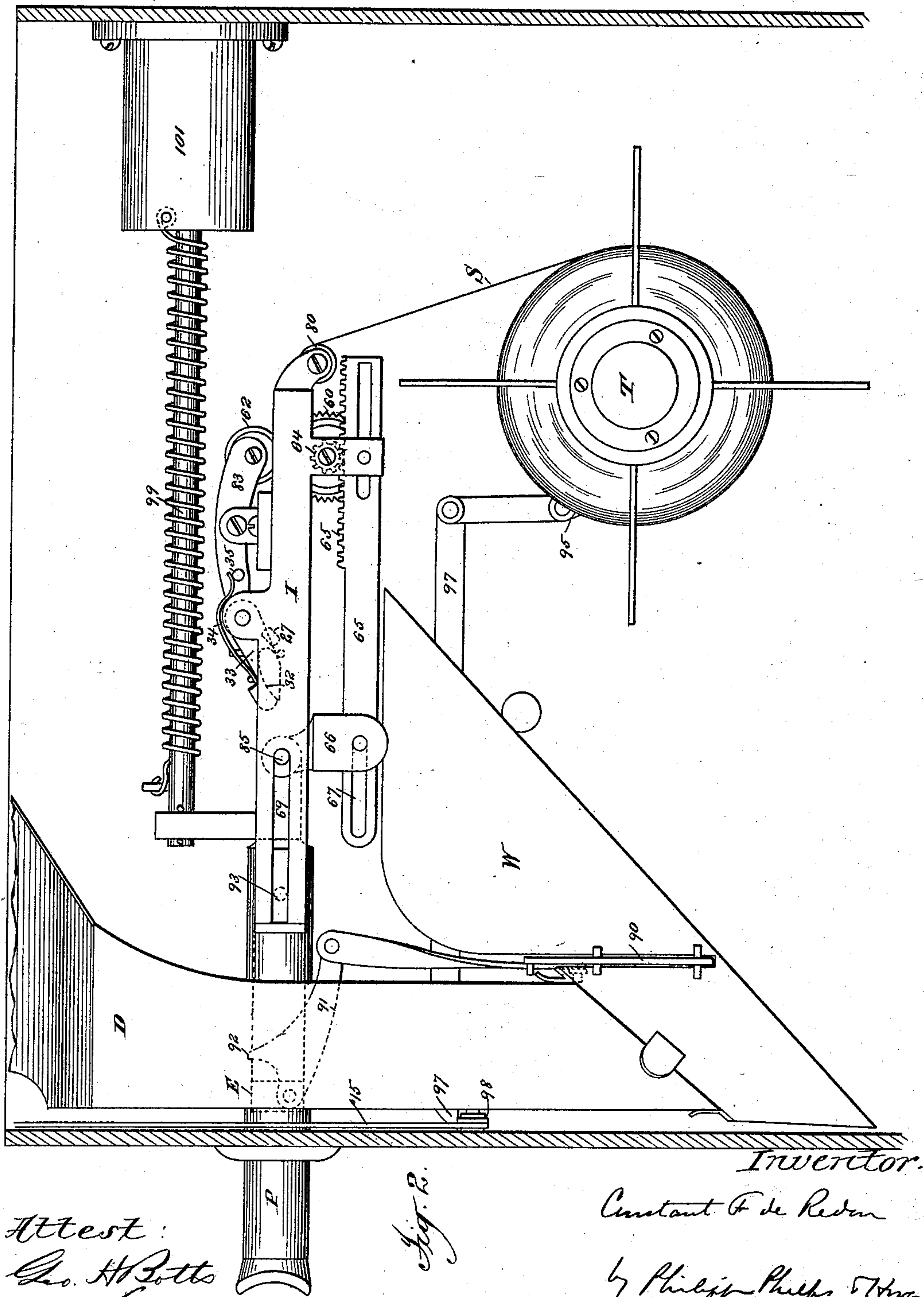
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7 Sheets—Sheet 2.

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VENDING APPARATUS.

No. 406,634.

Patented July 9, 1889.



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Fig. 2.

Constant F. de Redon

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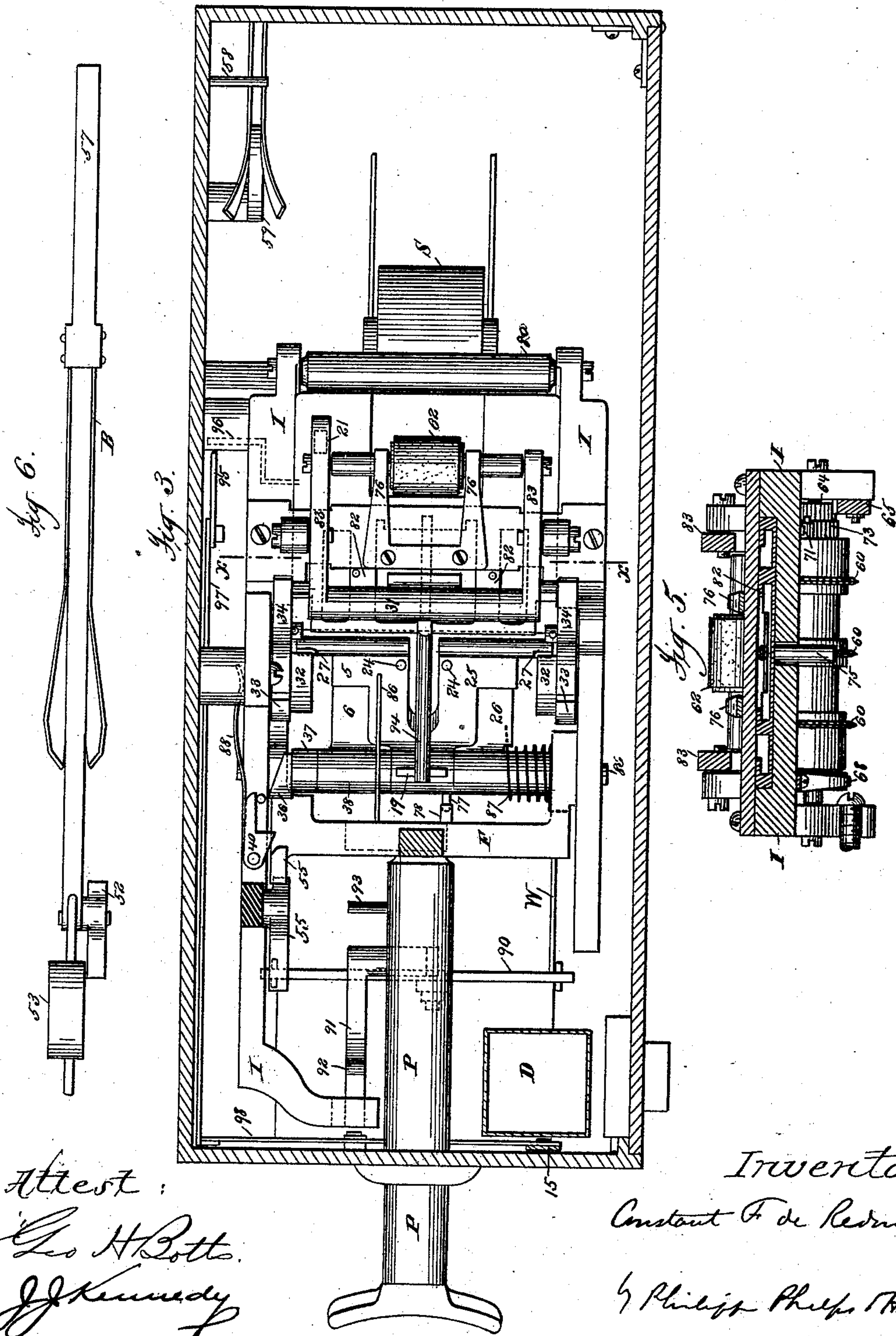
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7 Sheets—Sheet 3.

C. F. DE REDON.
VENDING APPARATUS.

No. 406,634.

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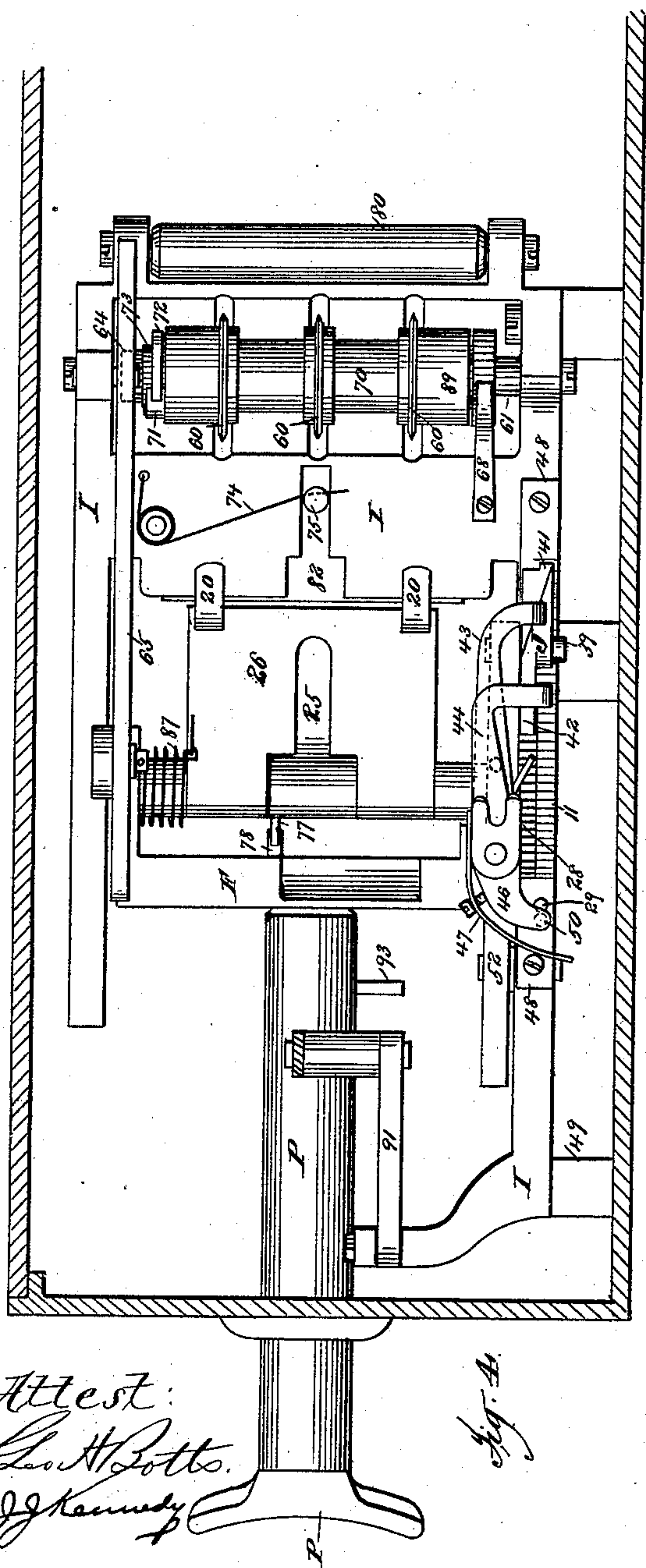
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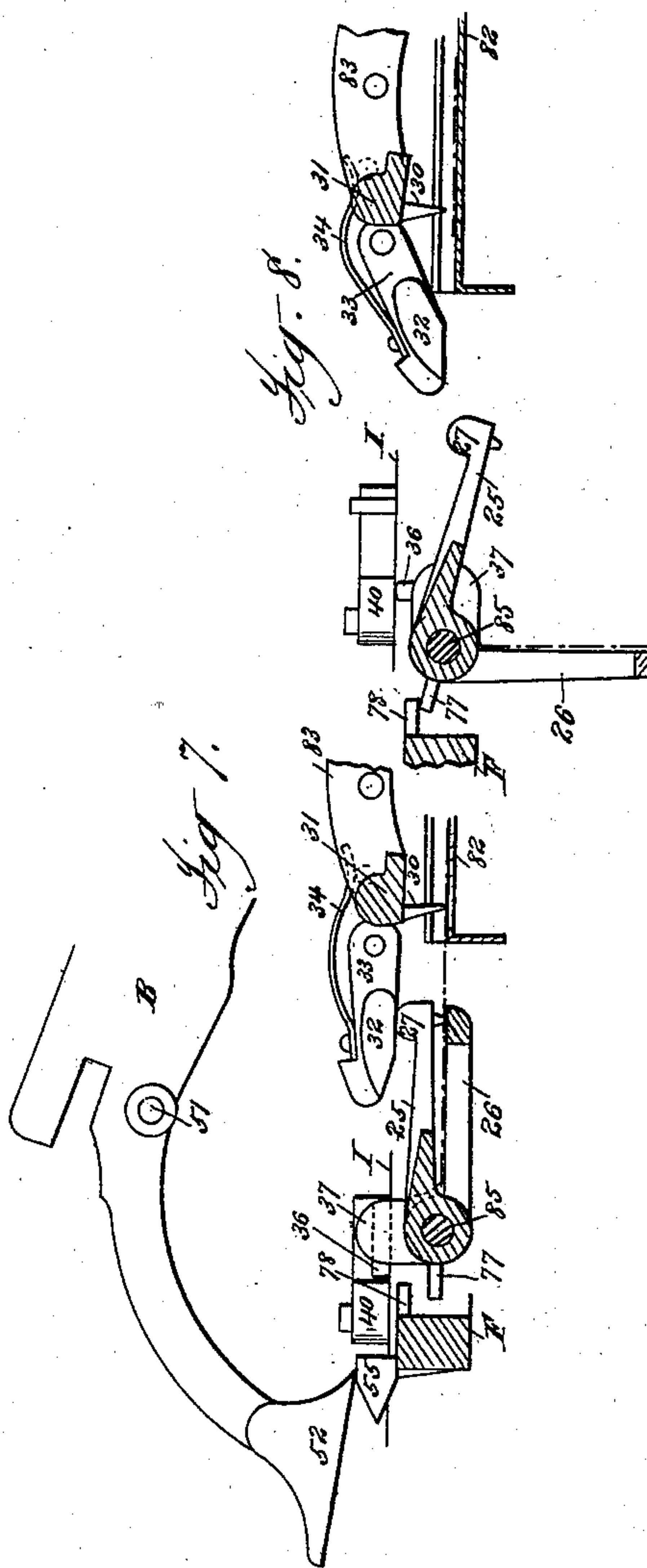
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(No Model.)

7 Sheets—Sheet 5.

C. F. DE REDON.
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Fig. 9.

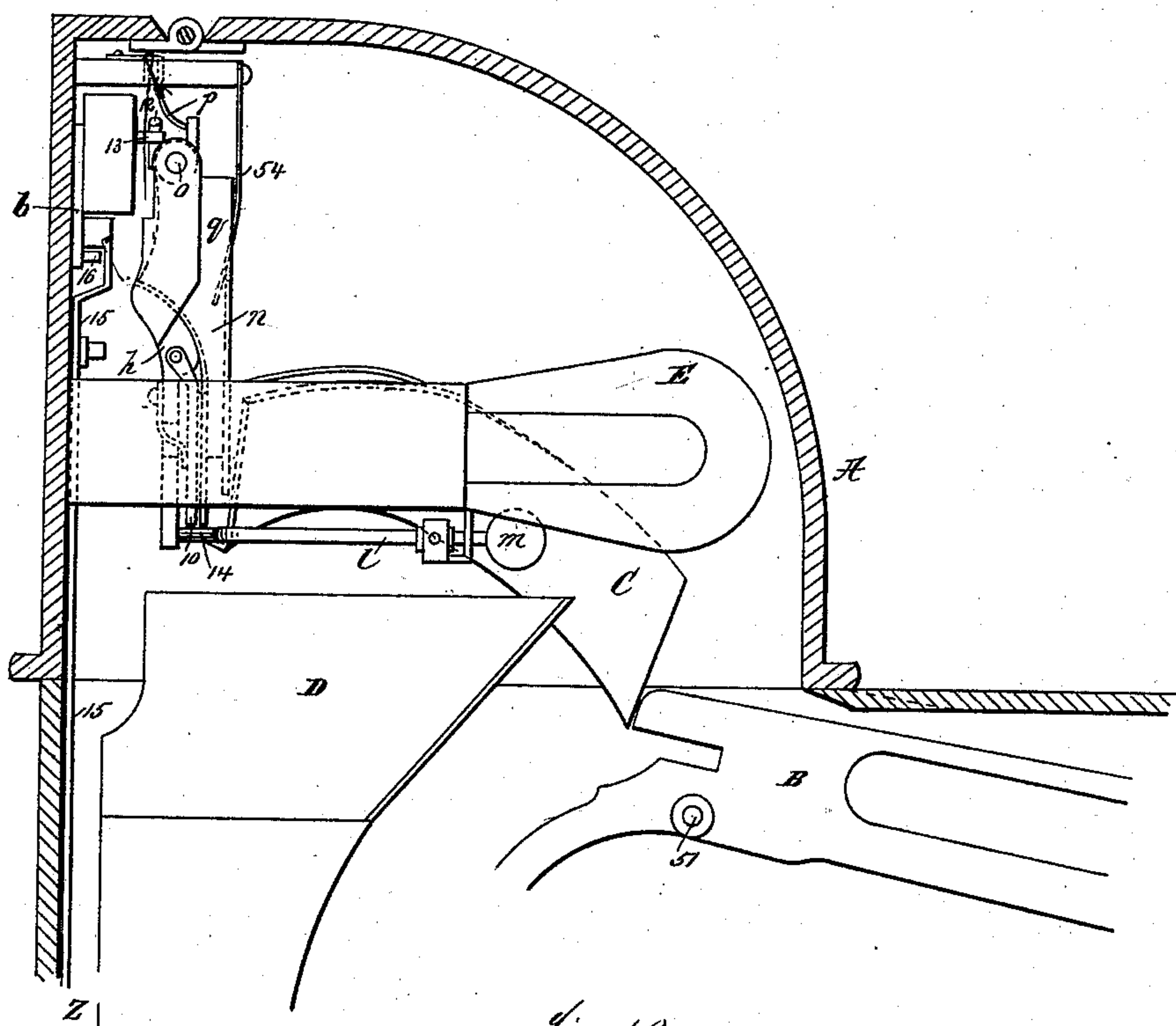
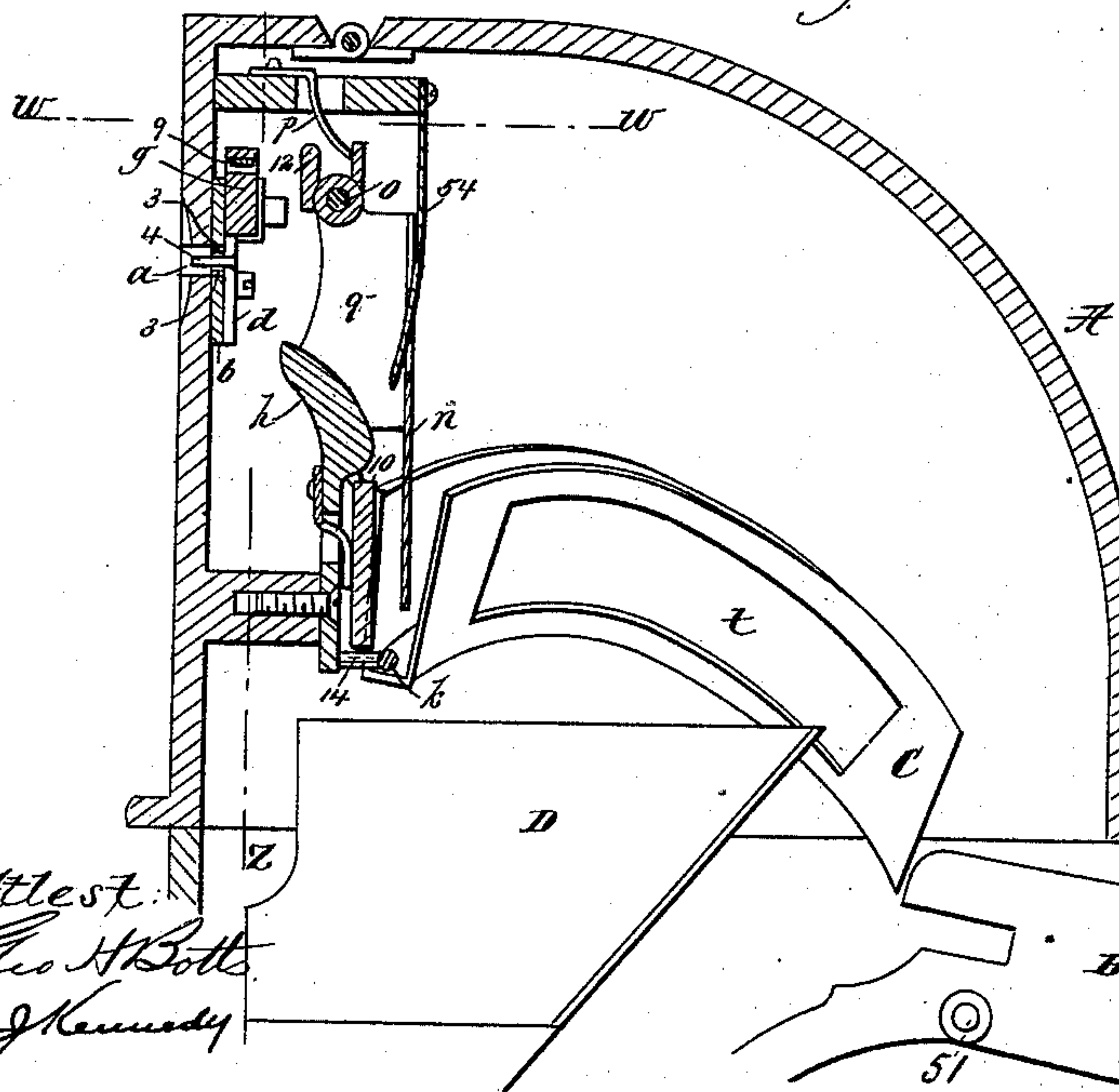


Fig. 10.



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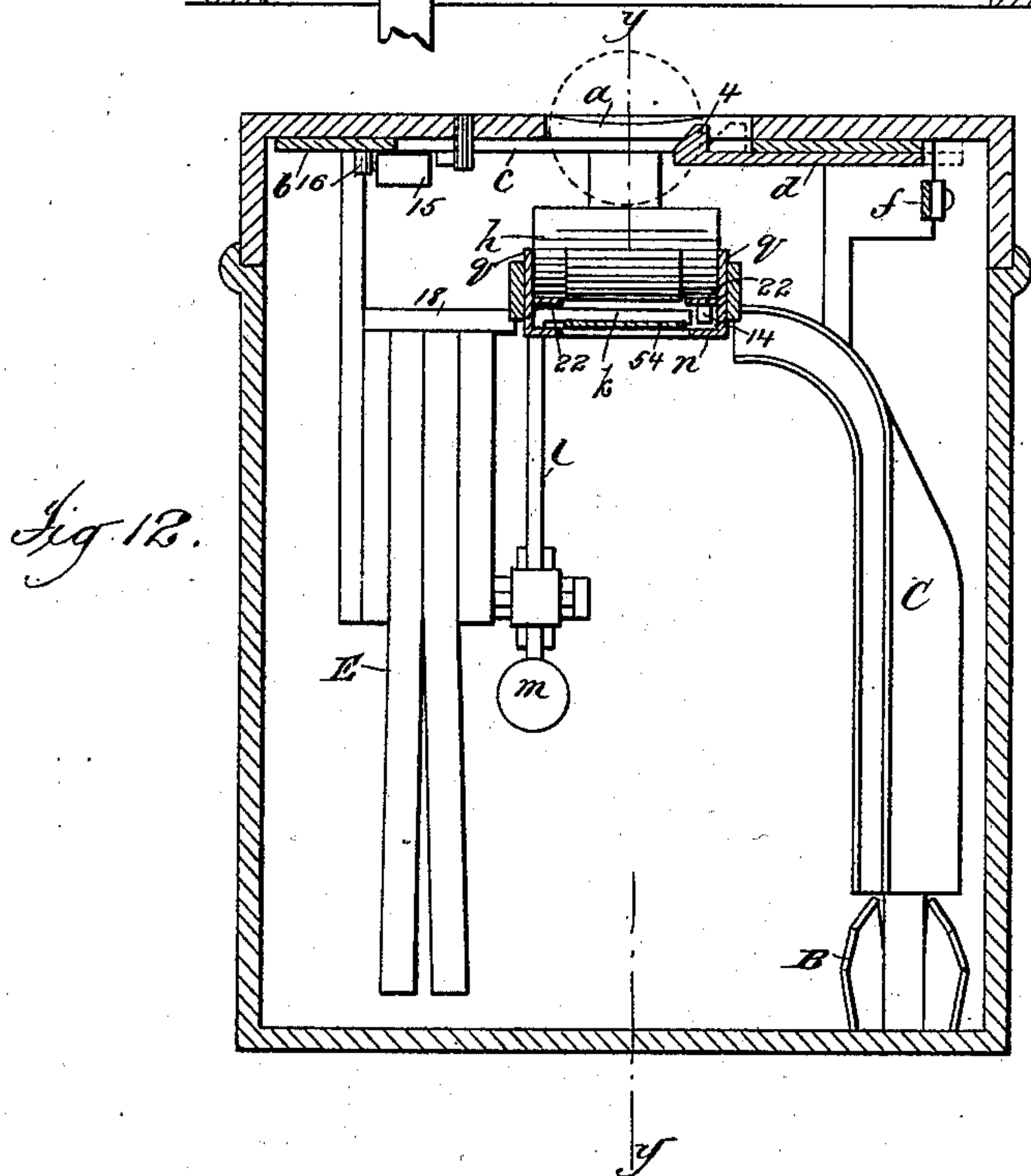
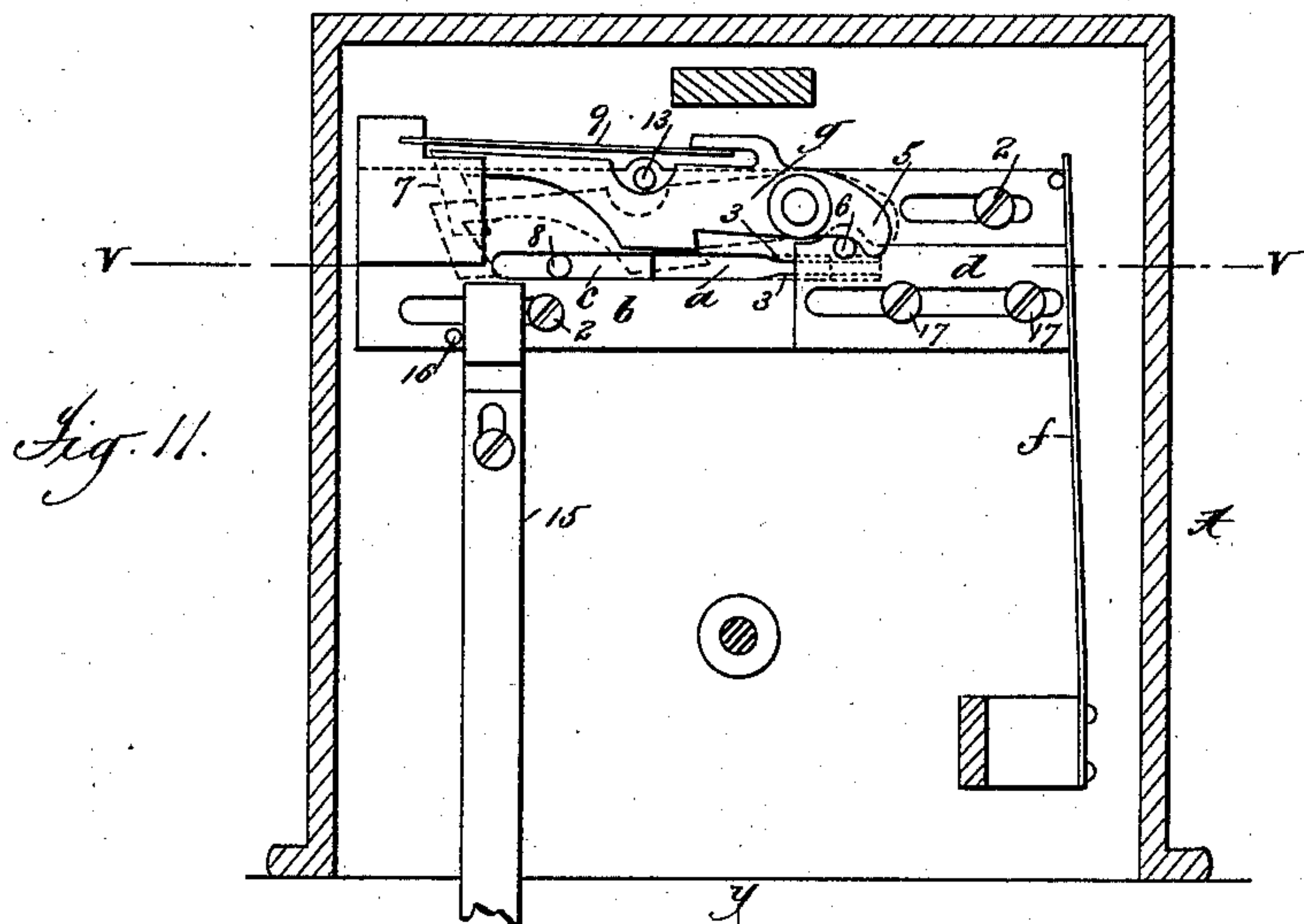
(No Model.)

7 Sheets—Sheet 6.

C. F. DE REDON.
VENDING APPARATUS.

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(No Model.)

7 Sheets—Sheet 7.

C. F. DE REDON.
VENDING APPARATUS.

No. 406,634.

Patented July 9, 1889.

Fig. 13.

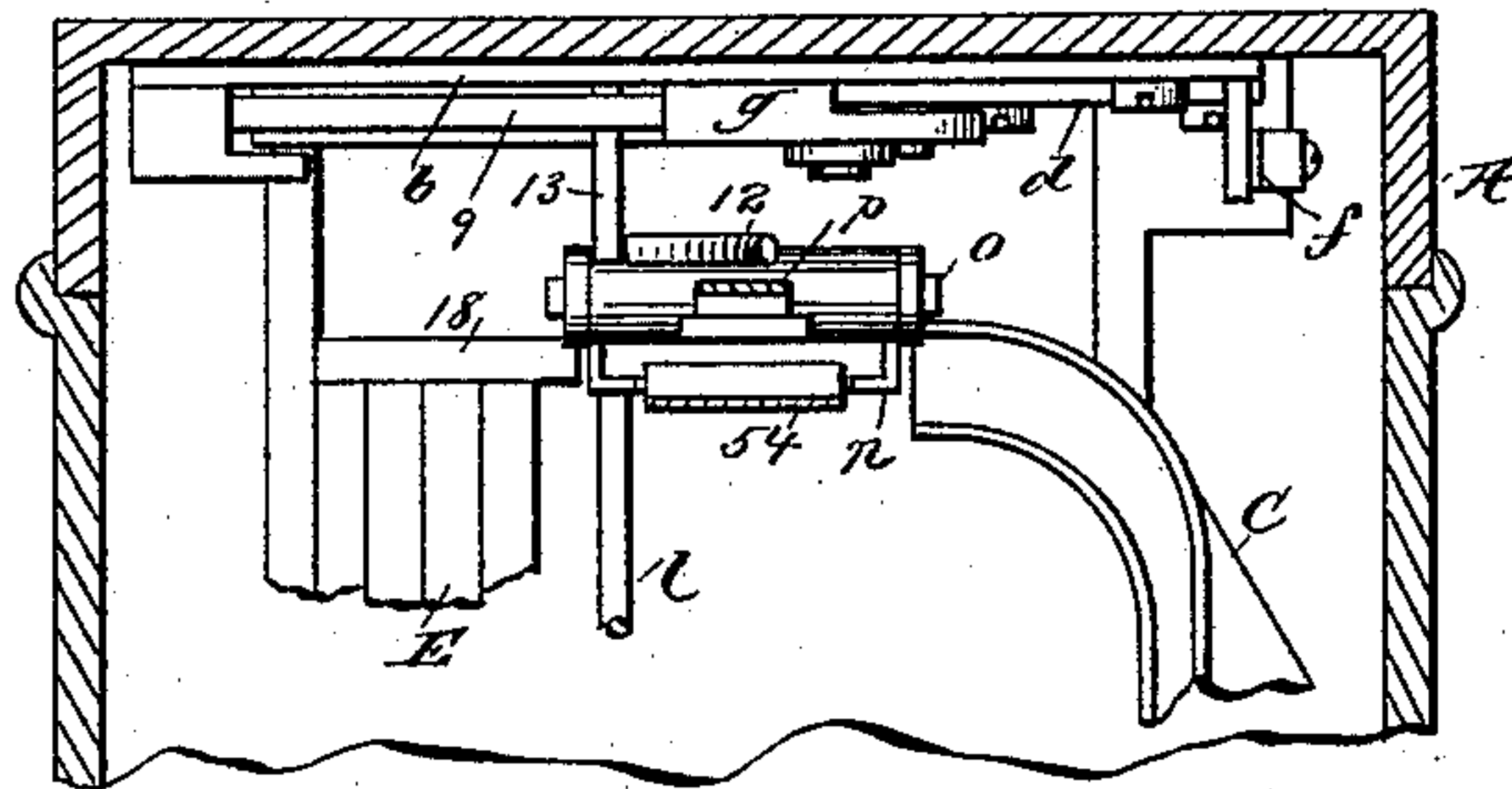


Fig. 15.

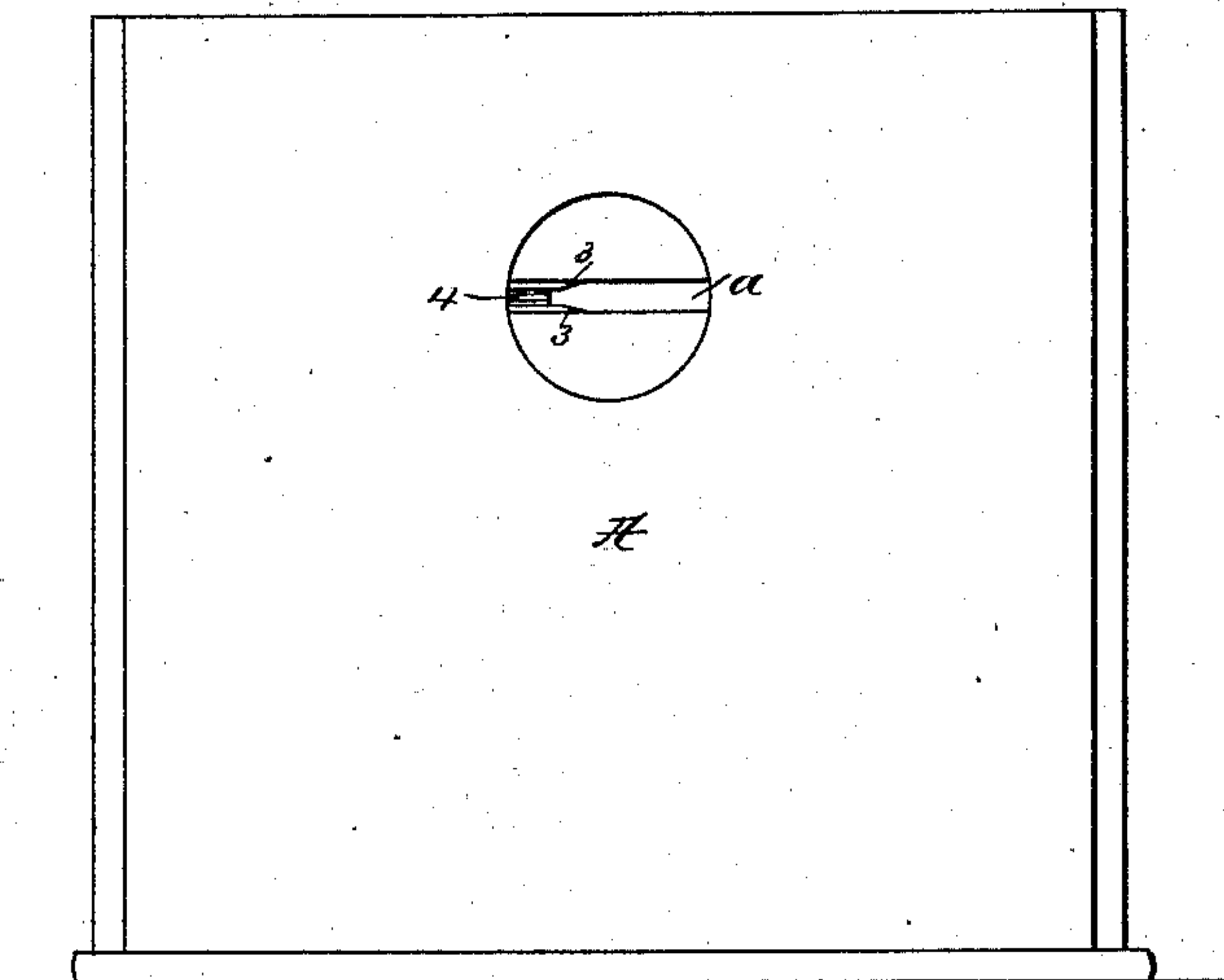
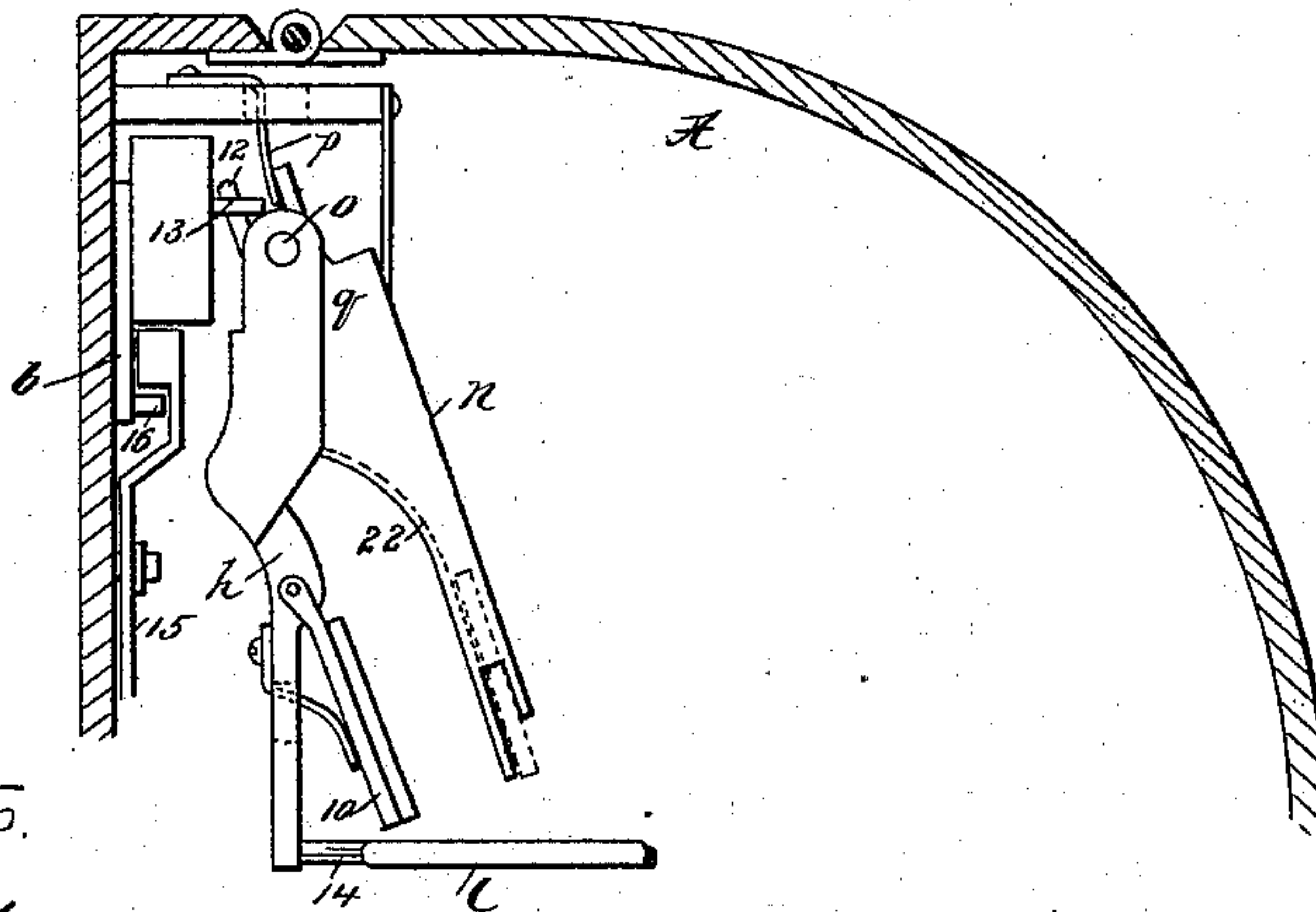


Fig. 14.



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UNITED STATES PATENT OFFICE.

CONSTANT F. DE REDON, OF NEW YORK, N. Y., ASSIGNOR TO FRANCIS L. WELLMAN, OF SAME PLACE.

VENDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 406,634, dated July 9, 1889.

Application filed May 6, 1889. Serial No. 309,709. (No model.)

To all whom it may concern:

Be it known that I, CONSTANT F. DE REDON, a citizen of the Republic of France, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Vending Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

These improvements relate to that class of vending apparatus in which the deposit of a suitable coin automatically unlocks or releases the mechanisms, so that they may operate to deliver a postage-stamp, railroad-ticket, postal-note, insurance-policy, or other similar article of value into such a position that it may be withdrawn from the apparatus.

The novel improvements effected by this invention can be best understood from a complete description of a machine embodying the same, and therefore no preliminary description will be attempted; but a detailed description of such a machine will first be given in connection with the accompanying drawings, and the various novel features of invention will thereafter be pointed out in the claims.

In said drawings, Figure 1 is a vertical longitudinal central sectional elevation of the principal mechanisms. Fig. 2 is a side elevation with the outer casing removed to expose the interior parts. Fig. 3 is a plan view of the principal mechanisms, the top plate and coin-detecting apparatus being removed to expose them. Fig. 4 is a plan view of the delivery apparatus as seen looking from beneath the same. Fig. 5 is a cross-sectional elevation of the delivery apparatus, taken on the line *x* of Fig. 3. Fig. 6 is a plan view of the controlling-lever. Figs. 7 and 8 are detail views of a portion of the delivery mechanism, the parts being in a different position from that shown in Fig. 1. Fig. 9 is a side elevation; Fig. 10, a central sectional elevation on line *y* of Fig. 12. Fig. 11 is a sectional elevation on line *z* of Fig. 10. Fig. 12 is a horizontal section on the line *v* of Fig. 11. Fig. 13 is a horizontal section on line *w* of Fig. 10. Fig. 14 is a side elevation, and Fig. 15 a front elevation, of the coin receiving, guiding, and detecting mechanism.

It being understood that the postage-stamp, railway or insurance ticket, postal-note, or similar article of value to be vended to the public by the aid of this machine will be prepared for use in the machine in the form of a long strip or ribbon, which may be rolled upon a spool or spindle, and that the use of the word "stamp" or "postage-stamp" is to be regarded as referring to any of the articles alluded to, a detailed description of the apparatus will now be given.

The general characteristics of the machine are the means for receiving one or more coins of the proper denomination or value, a guide for delivering the same to a governing-lever which operates to lock or unlock the delivery mechanism, a feeding mechanism for moving forward a stamp each time one has been delivered, a means for detaching the forward stamp from the strip, a means for depositing the detached stamp in the delivery-chute, a controlling-gate for determining the time of delivery of the stamp to the vendee with respect to the position of the delivery mechanism, and a safety apparatus securing the complete and orderly operation of the parts. The general operation of these devices is the introduction of the proper coin or coins into the apparatus and the consequent release of the delivery mechanism, whereupon the latter may be slid forward by moving the operating-handle, causing a stamp to be detached and delivered within the reach of the customer or vendee, a retraction of the delivery mechanism, causing another stamp to be fed forward in position to be operated upon and the parts to resume their normal position for a repetition of the operation.

There is embodied in the machine a coin receiving, guiding, and detecting apparatus, whereby a proper coin is received and guided into the apparatus to operate the same, or an improper thing, as a light coin, one of the wrong denomination or material or other spurious disk or article with which an attempt is made to operate the machine, will not only be prevented from entering the operating mechanism, but be ejected from the apparatus.

While any construction of mechanism capable of receiving and conveying only the proper operating coins to this apparatus may be em-

ployed in connection with it, I have illustrated an improved construction of such apparatus, it being the same as that embodied in my former application, Serial No. 305,397, filed March 30, 1889, and which for the purposes of this case has its parts designated by like characters as those employed in said application, whereby the construction and operation of its mechanism may be indentified and understood by a comparison of these illustrations with said application. This is shown particularly in Figs. 9, 10, 11, 12, 13, 14, and 15, but is not specifically described herein.

The principal devices are means to prevent the introduction through the coin-receiving slot or aperture *a* of a coin or piece of metal of less thickness than the required coin, a set of devices operating to arrest and eject any pieces of iron or metal capable of being attracted by a magnet, or pieces that are heavier than the required coin, or such as are not perfectly round and hence incapable of rolling, and of a set of devices designed to divert any coin of less diameter than the required coin.

The defective or spurious coin rejected by the detecting apparatus will be delivered to the hopper D and disposed of, while the appropriate coin will be guided to this apparatus to operate therein through the chute C, which delivers the same to the governing-lever B. This lever B is pivoted at 51, its one end being formed to provide a chute for receiving the coin from the chute C and conveying the same by a rolling operation to the extremity of said arm, which is over the coin-guide G, while the opposite end of said lever terminates in a shoe 52, that forms the lock controlling the delivery mechanism. The normal position of this governing-lever B is that shown in Fig. 1, which is maintained by means of gravity, a weight 53, capable of adjustment, being applied to the light end, as is seen in Fig. 1. In this position the shoe 52 is protruded within the pathway of the delivery mechanism, being opposed to the nose-piece 55 carried thereby, these two members thus forming a lock preventing the delivery mechanism from making a forward sliding movement. When the lever B receives a coin or any number of coins constituting the predetermined weight necessary to tilt it, they will be supported in its slot and rest against a stop 56, obstructing its open end, said stop 56 being supported on a spring-arm 57, whose extremity overhangs a stud 58, fixed above the coin-guide G, which coin-guide has a flared mouth 59 at its upper end, into which the delivery end of the lever B moves when tilted. When the coins operate to tilt this lever B, the shoe 52 at its end is raised so as to clear the point of the nose-piece 55 and its coin-carrying end is depressed until it enters into the mouth 59 of the coin-guide G and brings the spring-arm 57 into contact with the stud 58. The lever B thus rests by gravity in this position, but upon the initial forward

movement of the delivery mechanism, caused by pulling upon the handle P, will be farther tilted downward by the cam-like action of the nose-piece 55 against the shoe 52, which is a positive movement, causing the coin-carrying end of the lever to be depressed a sufficient distance to move the coin or coins within its open end away from contact with the stop 56, whose farther downward movement is prevented by the stud 58, the coins being thus set free and allowed to roll into the guide G and be thence conveyed to the storage-box H. The shoe 52 rests upon the top of the nose-piece 55 during the reciprocating movement of the delivery mechanism, and only passes off from said nose-piece to take its position before it as the return movement of the said delivery mechanism is completed. It is thus kept from obstructing the movements, except at the time when it is required to act as a lock, preventing the operation of the apparatus.

The delivery mechanism is supported by a frame I and operated by the reciprocating movement imparted to the sliding carriage F by the pulling of the handle P. Its feeding mechanism consists of a serrated wheel or wheels 60, carried by a lower shaft 61, their number being one or more, according to the width of the strip of stamps to be fed, and an upper roll 62, preferably rubber-clothed, carried by a shaft 63 and held to duty by the springs 76. The wheels 60 are fast upon a sleeve 70, which turns upon the shaft 61, being coupled thereto, so as to be moved in a forward or feeding direction by means of a pawl 71, carried by the sleeve 70, that engages with a ratchet-wheel 73, fast upon the shaft 61 and held to duty by a spring 72. The shaft 61 is driven to produce the feeding movement by means of a pinion 64, that meshes with a sliding rack 65. Motion is imparted to this rack by an arm 66, that is fast upon the sliding carriage F, the stud of which arm 66, during a part of the forward movement imparted by pulling the handle P, slides inoperatively in a slot 67 of the rack 65, and during the rest of the forward movement of the carriage the rack moves and turns the pinion 64, that is fast on the shaft 61. In this movement the pawl 71 is caused to drag inoperatively over the ratchet-wheel 73, while any rotation of the sleeve and consequent feeding movement of the wheels 60 is prevented by the detent-pawl 68, over which the teeth of a ratchet-wheel 89 drag in one direction and engage in the other. Upon the return movement of the sliding carriage F the arm 66 first moves idly, while its stud traverses the slot 67, and thereafter moves said rack 65 rearward, causing it to revolve the pinion 64 in the opposite direction, when the pawl 71, then engaging the ratchet-wheel 73, and with it the wheels 60, is caused to revolve and impart a feeding movement to the strip S. This strip is wound upon a reel T and is led over a guide-roller 80, and thence passes through a sliding

guide 82, that moves in proper ways in the frame I and is constantly pressed forward by means of a spring 74, that bears upon a stud 75, projecting downward from the bottom of said guide.

The means for detaching the forward stamp from the strip consists of a detent 30 and sliding jaws 25 26. The detent 30 might be a lip projecting from the bar 31, as shown, or a roller turning on such a bar and of a proper length to impinge upon the stamps at the appropriate time and press the same upon the lower plate of the guide 82. This detent 30 has its bar 31 hung in arms 83, pivoted in the frame I and carrying at their opposite ends the feeding-roller 62 on shaft 63, which arrangement is provided so that when the detent 30 is depressed to nip and securely hold the strip of stamps the feeding-roll shall be raised out of feeding contact therewith, and vice versa. The roller 62 is pressed down into feeding position by the springs 76 bearing upon the shaft, and the arms 83 are moved to depress the detent 30 by means of the pivoted arms 33 and their springs 34, that bear on studs 35 on said arms 83, which springs provide an elastic action between these co-operating parts; but this might also be similarly accomplished by attaching the bar or shaft 31 to the arms 83 by spring-hangers and making the arms 33 rigid.

The jaws 25 26 are hung by sleeves on a shaft 85, which is journaled in the sliding carriage F, and has its ends guided in slots 69 of the frame I, so that said jaws will reciprocate with the carriage F and the latter be maintained in a horizontal plane. The upper jaw 25 is held downward by its gravity, and at times is pressed by a spring 86, and the lower jaw 26 is pressed upward by means of a spring 87. Upon the initial forward movement of the sliding carriage F the cams 27 on the upper jaw 25 engage and pass beneath the cam projections 32 on the pivoted arms 33, thus simultaneously causing the jaw 25 to be pressed into nipping contact with the jaw 26 and the detent 30 to be elastically pressed onto the bottom of the guide 82, which nipping operation both of the jaws 25 and 26 and the detent 30 continues while the cams 27 are passing beneath the cams 32. As the arms 33 are thus raised, they immediately act to cause the detent 30 to hold the stamp just behind the line of perforations, and continue to securely hold the same while the jaws 25 26, having the foremost stamp nipped between them, move forward with the sliding carriage F, the result of which is that said foremost stamp is detached from the strip on the line of perforations which separate stamp from stamp. As the cams 27 leave the cams 32 they permit the arms 33 to tilt downward, and thus allow the arms 83 to rock and raise the detent 30 from nipping contact with the bottom of the guide 82. Thus released this guide is caused to slide forward, as in Fig. 8, by means of the spring 74 acting on the stud 75

to form a feeding-guide extended forward toward the jaws 25 26, thus being in position to perfectly guide the forward stamp between said jaws when they are returned. Should the spring 74 fail in its operation, the cross-piece 19 of the tongue 94, attached to this guide 82, will be engaged by the two pins 24, carried by the upper jaw 25, and the guide will thus be pulled forward to co-operate with the said jaws. When the sliding carriage F has moved forward sufficiently to bring the cam projection 36, carried by a rock-arm 37 on the sleeve 38 of the lower jaw 26, into contact with the cam 40, it will cause said lower jaw to be rocked downward, as shown in Fig. 8, the jaw 25 participating in this movement to the extent that its tappet 77 and the stops 78 will permit, thus opening the jaws to release the stamp and drop the same into the delivery-chute W. The cam 40 is pivoted and held to duty by a spring 88, so that it may move laterally to be passed by the cam projection 36 upon the return movement of the sliding carriage F. These jaws 25 26 close as the carriage F continues its forward movement and the cam projection 36 clears the cam 40. The detached stamp deposited in the delivery-chute W might now be allowed to pass out into the hands of the customer if it were not requisite that the said operating customer should set the mechanism in a position for re-use. In order to compel him to do this, a controlling-gate 90 within the delivery-chute W is provided, which limits the actual delivery of the stamp to the time when the sliding carriage F is pulled outward far enough to set the mechanisms all in condition for the retracting operation and to permit the spring-operated rod 99 to return the parts to their normal position. That this may be done without unnecessary jar to the machine a piston 100 is attached to said rod and made to move in the cylinder 101, thus forming a spring-cushion. This gate 90 slides vertically in suitable ways in the delivery-chute W, being raised by means of a lever 91, pivoted to an arm of the frame I, an upwardly-projecting toe 92 of which lever 91 is engaged by a tappet 93, carried by the handle P of the frame F. The lever 91 and tappet 93 on the sliding frame thus constitute a tripping device. At the moment when this gate is raised to clear the delivery-chute W the safety apparatus will have been released, so that a rearward movement of the sliding frame F may take place. This safety apparatus is provided so that the sliding carriage F must make its full extent of forward movement before it can take up any part of its return movement, thus compelling all of the mechanisms to perform their full functions before the stamp can reach the hands of the consumer or any part of the return movement of the frame F be performed. This safety apparatus consists of a double ratchet-bar secured to the under side of the stationary frame I on the side opposite to that occupied by the rack 65. The teeth 28 of this

ratchet-bar point in a rearward direction and the teeth 11 in the opposite direction. These teeth 28 11 are engaged by a double pawl J, pivoted at 39 to the carriage F. Its end 41 engages with the teeth 11 and its end 42 with the teeth 28. This pivoted pawl J is operated upon to throw one or the other of its ends into operative contact with the rack by means of cam-arms 43 44, held up to duty by a spring 45 and attached to and operated by a rocking lever 46, that is held normally in position to cause the cam-arm 43 to hold the end 41 of the pawl J into engagement with the rack 11 during the forward movement of the sliding carriage F by means of a spring 47, that bears against said lever and the stop 48. Thus during the forward movement of the carriage F the end 41 of the pawl J will travel over the rack 11, while the end 42 of the pawl J will be disengaged or travel free from the rack 28; hence, although a free forward movement is permitted by this end 41 of the pawl J, any attempt to move the carriage F rearward would be impeded by said pawl 41, which will remain engaged with the rack 11 until the whole extent of the forward movement of said carriage F is accomplished, at which time the spring 47 comes into contact with a block 49, depending from the frame I, which is just as the gate 90 is raised. When this spring-arm 47 engages the block 49, it moves the vibrating lever 46 to throw the arm 43 out of engagement with the end 41 of the double pawl J and brings the arm 44 into engagement with the double pawl, so as to throw its end 42 into action with the ratchet 28, thus withdrawing the end 41 from engagement with the rack 11; hence as the sliding carriage F moves rearward the end 42 will move freely over the ratchet 28, but prevent any forward movement of the carriage F to take place until its full rearward throw has been made, at which time a stud 50 on the lever 46 will engage with a pin 29 and throw the pawl end 41 in operative relation to the rack 11. The block 49 and pin 29 thus constitute a switch, operating through the rocking lever 46 and its attachments to control the operative action of the pawl J. When the jaws 25 26 move rearward, they are opened to receive between them the stamp that has been fed forward and projects slightly beyond the guide 82, then extended in its foremost position by means of the cam ends 27, passing over the cam 32, the action being to raise the jaw 25 from the jaw 26 against the pressure of the spring 86. As the lower jaw meets the protruded guide 82, it pushes it back to place against the pressure of the spring 74, the lower jaw 26 then passing for nipping support onto the toes 20, that extend from the frame I, while the cams 27 of the jaw 25 are pressed down by the spring 86, so as to again pass beneath the cams 32 upon a repetition of the operation or forward movement of the sliding carriage. As this rearward movement of the jaws 25 26 is finishing,

and just as the feeding movement of the ribbon of stamps is finished, the cam 21 on the guide 82 will engage one of the arms 83 and raise the feeding-roller 62 sufficiently to permit the ribbon of stamps to straighten out and then lie flat, thus taking up any over-feeding that may have occurred. As this is done at each feeding movement, it operates to keep the stamp in the proper relative position with respect to the mechanisms.

For the purpose of putting the machine out of action when the stamps are exhausted, a suspending device is provided, consisting of a rod 15, that may be dropped to bring its stopping-head in front of the stud 16, that is carried by the sliding plate b, which is thus prevented from being moved to open the slot a sufficiently to permit the introduction of the appropriate coin. This rod 15 is pivoted to one end of a cross-lever 98, the opposite end of which is held depressed by a latch-bar 97, so that normally the head of the bar 15 is held raised above the stud 16. The latch-bar 97 is moved to trip the lever 98 by means of a lever 95, when the latter is engaged by a spring-arm 96, carried by the reel upon which the ribbon of stamps is wound. This arm 96 extends sidewise from the reel (see Fig. 3) and is maintained in a position to keep it out of engagement with the lever 95 by being bound close to the core of the reel by the body of stamps wound thereon. When, however, the ribbon of stamps is nearly exhausted and becomes loose, this arm will press outward, and, engaging the lever 95, it will release and drop the arm 15, thus interposing the head of the arm 15 in the pathway of the plate b, and, stopping its movement, prevent the introduction of a coin to cause the operation of the apparatus.

What is claimed is—

1. A delivery mechanism for a stamp-vending apparatus, consisting of the combination, with strip-feeding and stamp detaching and delivering apparatus, of a sliding carriage and means for reciprocating the same, substantially as described.

2. In a vending apparatus, the combination, with strip-feeding and stamp detaching and delivering apparatus, of a sliding carriage and a pulling-handle, substantially as described.

3. In a vending apparatus, the combination, with a sliding carriage through the reciprocation of which the various operations of feeding, detaching, and delivering the stamp are accomplished, of a governing-lever normally acting to lock the carriage stationary and adapted to gravitate and release said carriage, substantially as described.

4. The combination, with the sliding carriage F, of the double ratchet-bar, vibrating double pawl, and a switch operating at the end of a completed movement of the carriage in either direction to set the pawl into engagement with the ratchet-bar to prevent a false movement of said carriage, substantially as described.

5. In a vending-machine, the combination, with a sliding or reciprocating carriage whereby the feeding, detaching, and ejecting operations are effected, of a safety apparatus operating to compel the completion of the movement of the carriage, once begun, in either direction before the reverse movement can be made, substantially as described.
6. In a vending-machine, the combination, with the apparatus for feeding the ribbon of stamps forward, of a detent operating to nip and hold the ribbon of stamps and a detaching apparatus operating to seize the foremost stamp and by a sliding movement to detach the same from the ribbon, substantially as described.
7. In a vending-machine, the combination, in the delivery mechanism for the stamps, of a stationary part through which the stamps are fed, means for suspending the movement of the strip of stamps, and a sliding carriage carrying a detaching apparatus operating to seize the foremost stamp, remove it from the ribbon of stamps, and deposit it in a delivery-chute, substantially as described.
8. In a vending-machine, the combination, with the stationary part of the delivery mechanism through which the stamps are fed and periodically held and the sliding carriage carrying the detaching apparatus operating to seize the foremost stamp, remove the same from the ribbon of stamps, and deliver the same, of a controlling-gate and means preventing its opening to discharge the stamp until the sliding carriage has completed its actuating movement, substantially as described.
9. The combination of the sliding carriage, the controlling-gate, and intermediate tripping device co-operating so that the forward movement of the carriage shall be completed before it raises the said gate to discharge the stamps, substantially as described.
10. The combination, with the sliding carriage carrying the stamp-delivering jaws 25 26 and means for feeding forward the strip of stamps, of the sliding stamp-guide 82, whereby the foremost stamp is supported close to the jaws when the same advance to seize it, substantially as described.
11. The combination, with the sliding carriage F, ratchet-bar having opposed teeth 28 11, of the double pawl 42 41 and switch-lever 46, with its arms 43 44, substantially as described.
12. The combination, with the sliding carriage F and ratchet-bar having opposed teeth 28 11, of the double pawl 42 41, switch-lever 46, its arms 43 44, and the stop-block 49 and stop-pin 29, substantially as described.
13. The combination, with the rack carried by the sliding carriage F, the pinion driven thereby, and the feeding-wheels, of a clutch for connecting the shaft carrying the pinion with the said pinion-wheel, so as to rotate them to perform the feeding operation, substantially as described.
14. The combination, with the sliding carriage F, its rack 65, the feeding-roll 62, wheel 60, and pinion 64 on shaft 61, of ratchet-wheel 73 and pawl 71, substantially as described.
15. The combination, with the guide 82, detent 30, and means for detaching the foremost stamp from the strip, of the feed-roller 62 and means for raising it temporarily out of action at the end of its feeding movement, substantially as described.
16. The combination, with the feed-roller 62 and jaws 25 26, of the sliding guide 82 and its cam 21, substantially as described.
17. The combination, with the jaws 25 26 and sliding guide 82, of a spring 74, substantially as described.
18. The combination, with the jaws 25 26 and pins 24, of the sliding guide 82 and its tongue 94, substantially as described.
19. The combination, with the feeding-roll 62 and detent 30, of the reciprocating jaws 25 26 and cam-arms 33, substantially as described.
20. The combination, with the reciprocating jaws 25 26 and detent 30, of actuating cam-arms 83 and elastic connections between said jaw 30 and arms 33, substantially as described.
21. The combination, with the nipping-jaws 25 26 and the sliding carriage, of the rock-arms 37 and cams 36 and 40, substantially as described.
22. The combination, with the nipping-jaws 25 26, of the tappet 77 and stop 78, substantially as described.
23. The combination, with the nipping-jaws 25 26, of the tappet 77, stop 78, and cams 36 and 40, substantially as described.
24. The combination, with the nipping-jaws 25 26, of the toes 20, substantially as described.
25. The combination, with the nipping-jaws 25 26 and arms 33, of the spring 86, substantially as described.
26. The combination, with the nipping-jaws 25 26 and arms 33, of the spring 86 and toes 20, substantially as described.
27. The combination, with the sliding carriage F and its tappet 93, of the gate 90 and lifting-lever 91, substantially as described.
28. The combination, with the sliding carriage F and its nose-piece 55, of the governing-lever B and its shoe 52, substantially as described.
29. The combination, with the sliding carriage F and its nose-piece 55, of the governing-lever B, its shoe 52, stop 56, and stud 58, substantially as described.
30. The combination, with the sliding carriage F and its nose-piece 55, a governing-lever B, its shoe 52, and stop 56, of the stud 58 and coin-guide G, substantially as described.
31. The combination, with the casing having coin-slot *a*, the sliding plate *b*, co-operating therewith, and the arm 15, of the rocking lever 98, latch-bar 97, lever 95, and actuating

spring-arm 96, released to operate upon said lever 95 by unreeling the ribbon or strip of stamps therefrom, substantially as described.

32. In a vending-machine, the combination, 5 with the sliding carriage whereby the feeding, detaching, and ejecting operations are effected, of the spring-operated retracting-rod, substantially as described.

33. In a vending-machine, the combination, 10 with the sliding carriage whereby the feeding, detaching, and ejecting operations are effected, of the cushioned rod 99, substantially as described.

34. In a vending-machine, the combination, with the sliding carriage whereby the feed- 15 ing, detaching, and ejecting operations are effected, of the rod 99, piston 100, and cylinder 101, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing 20 witnesses.

CONSTANT F. DE REDON.

Witnesses:

J. J. KENNEDY,
T. H. PALMER.