No. 741,866. PATENTED OCT. 20, 1903.

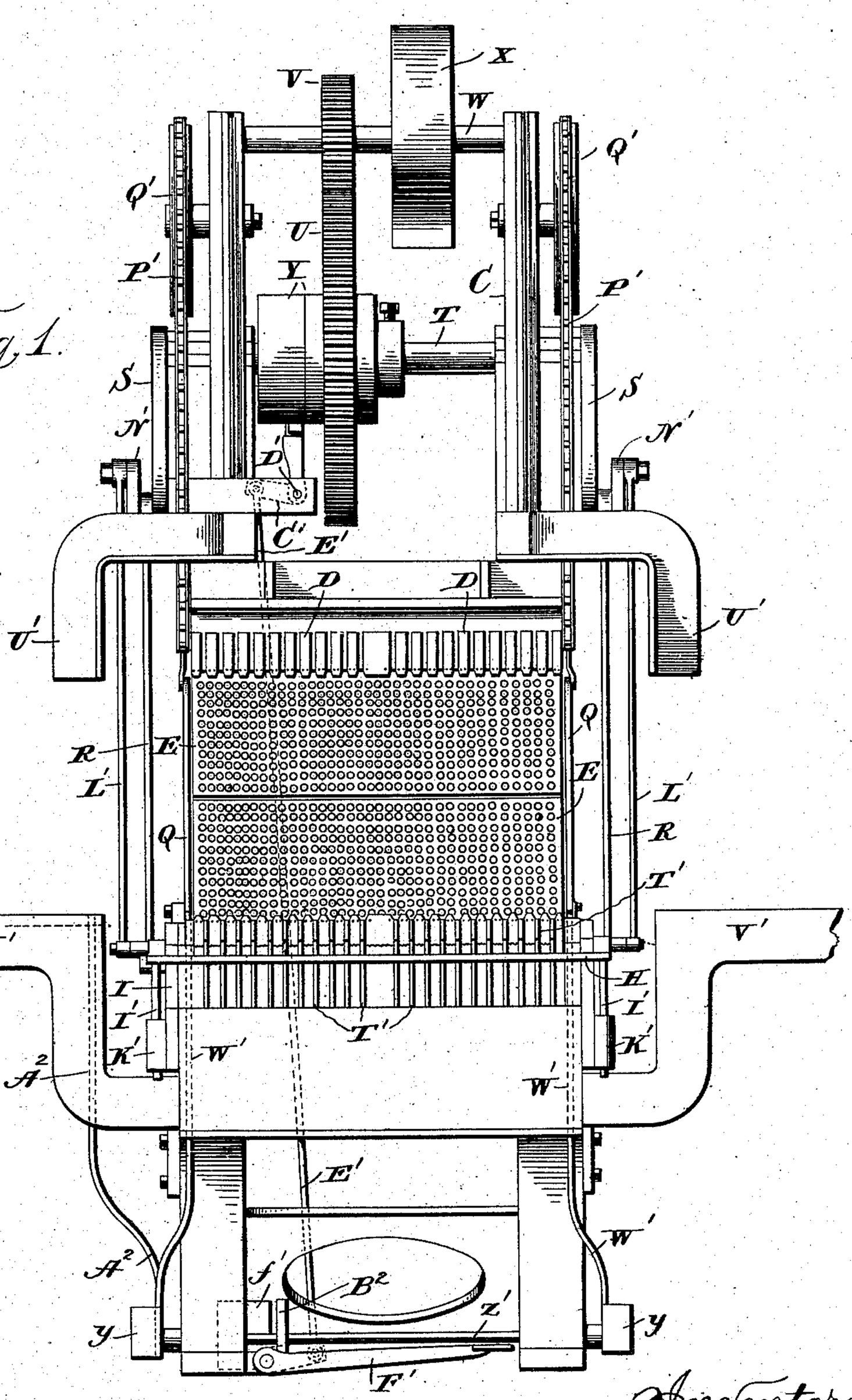
W. E. WILLIAMS.

MACHINE FOR PUNCHING MATCHES FROM PLATES.

APPLICATION FILED APR. 29, 1899.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Jas. E. Hutchinson.
Chas. J. Williamson.

Inventor.
William E. Williams, by
Prindle & Russell, his Attys

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NO MODEL. 5 SHEETS—SHEET 2.

Fig. 3.

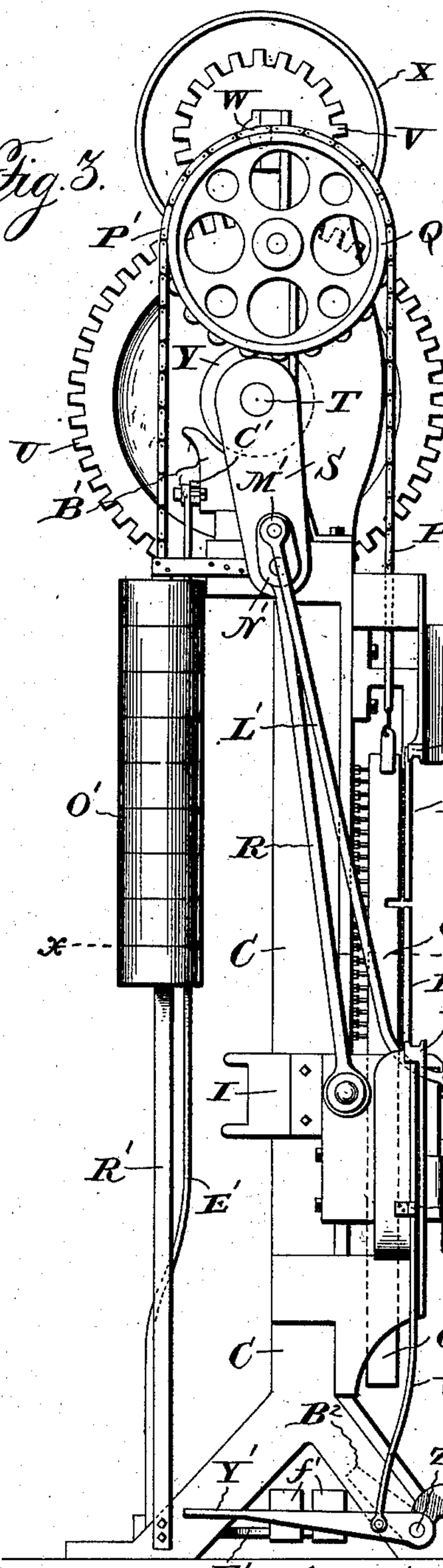
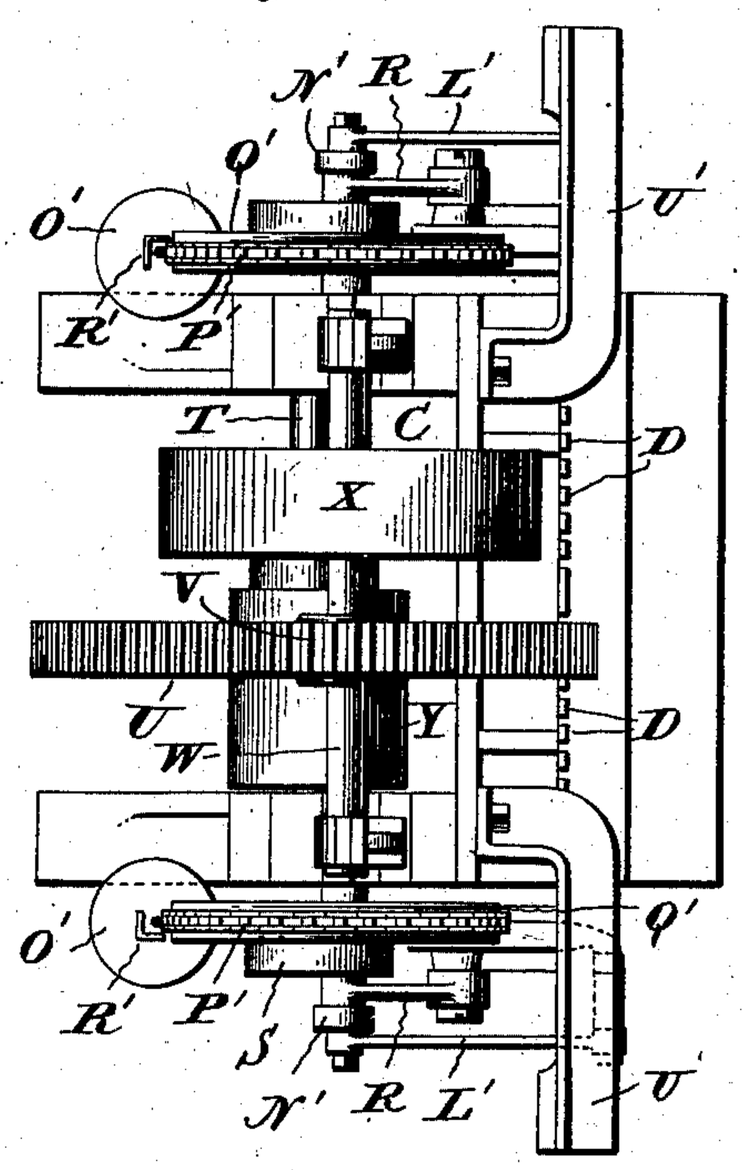


Fig. 2.



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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 4.

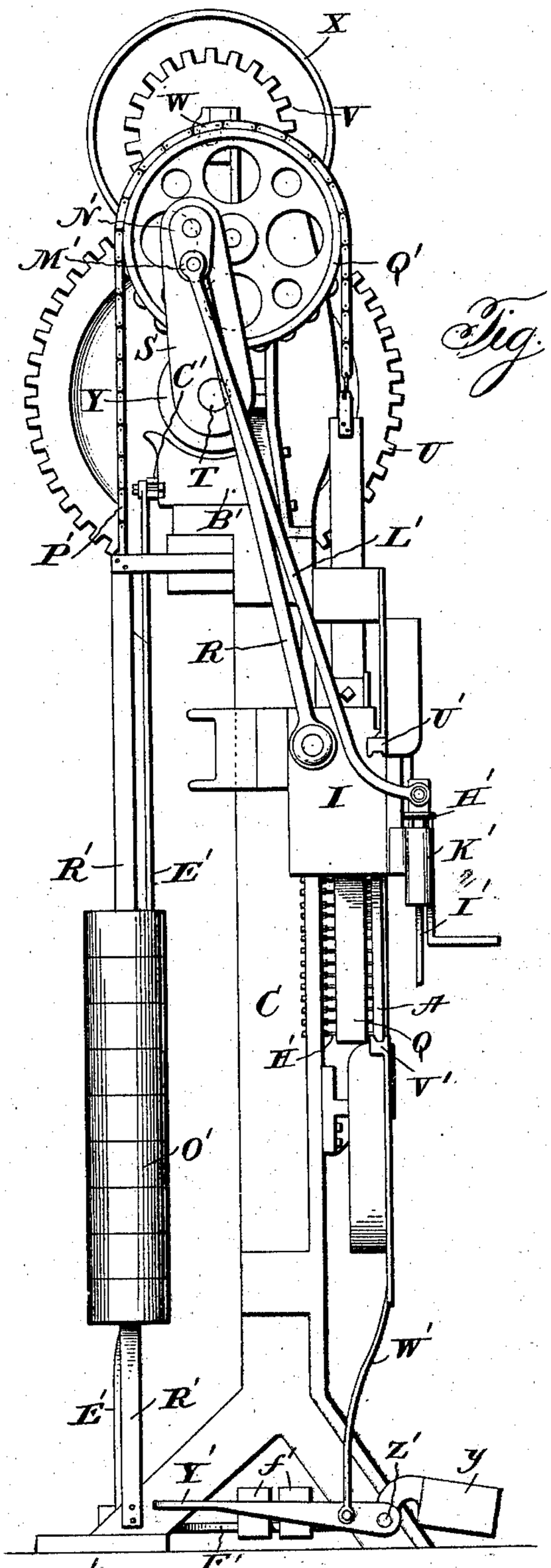
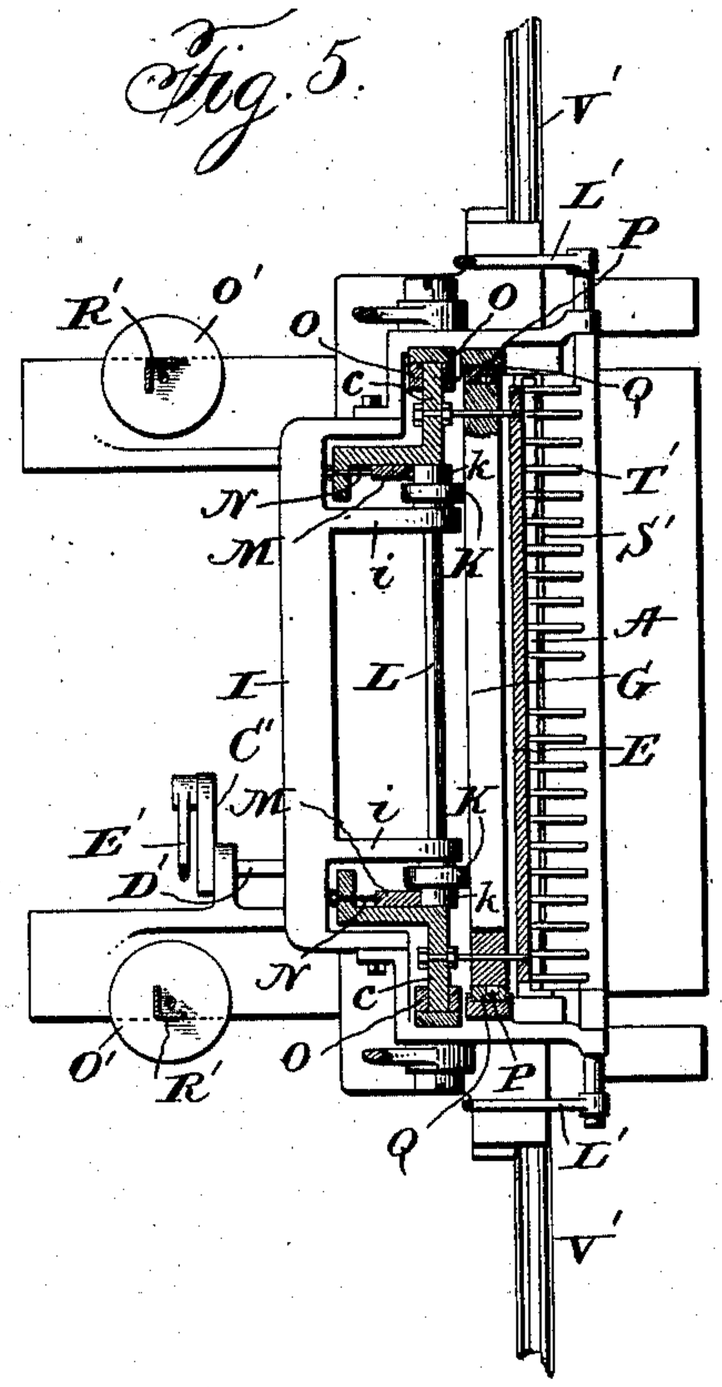


Fig. 5.



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NO MODEL. 5 SHEETS—SHEET 4.

Fig. 6.

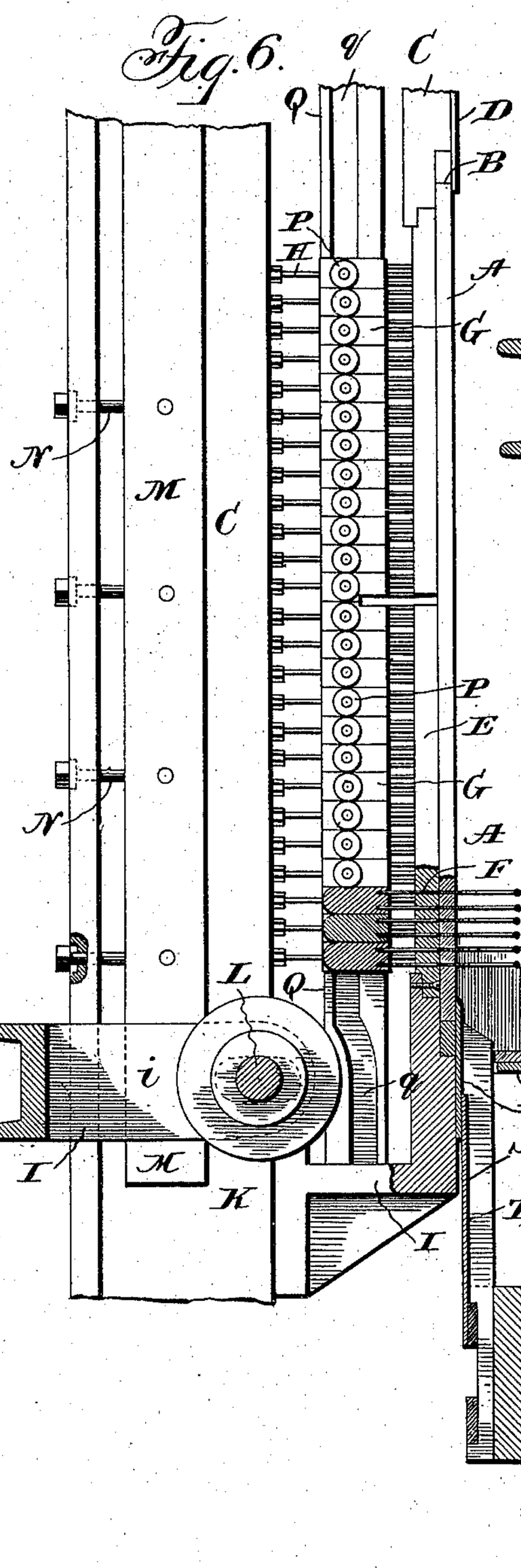


Fig. 7.

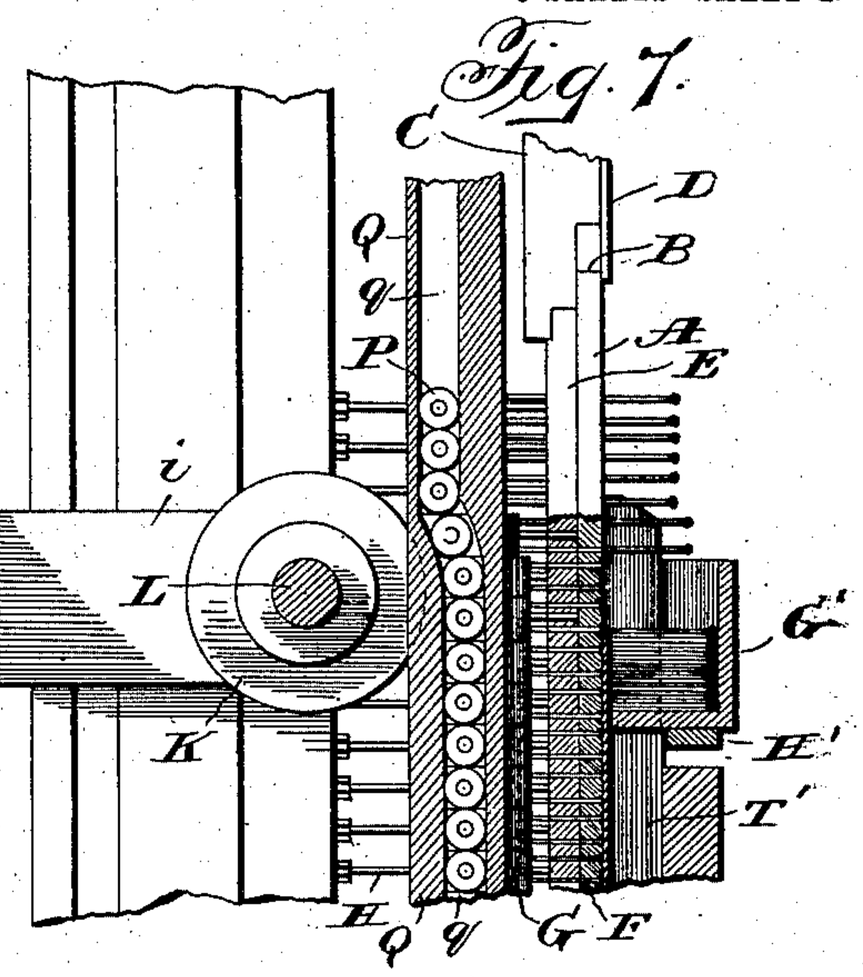


Fig. 8.

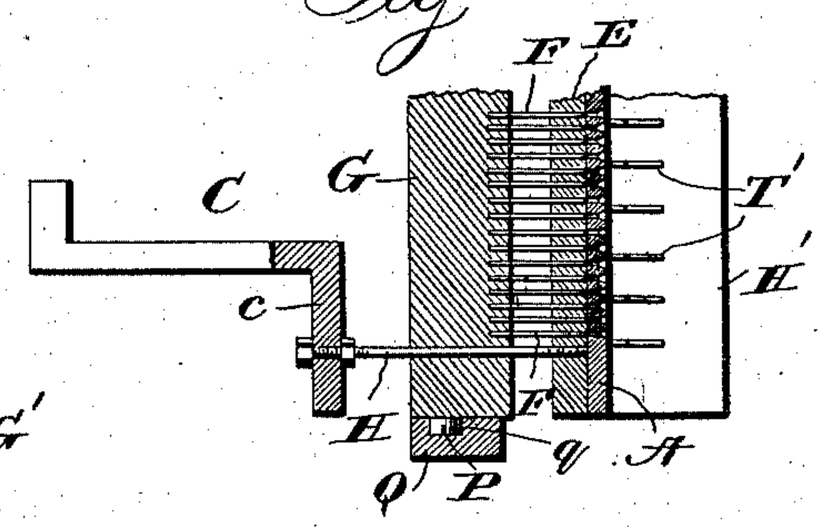
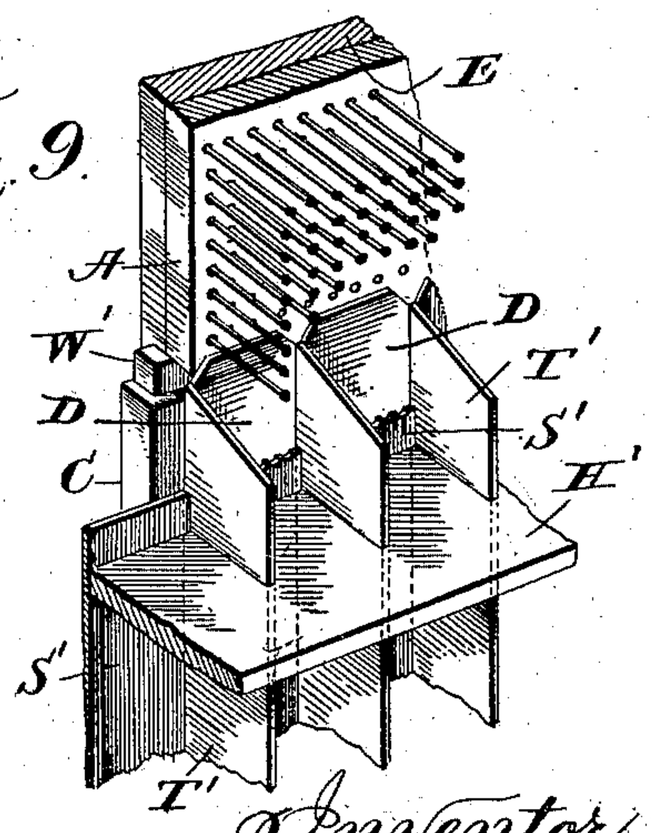


Fig. 9.



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NO MODEL. 6 SHEETS—SHEET 5.

Fig. 10.

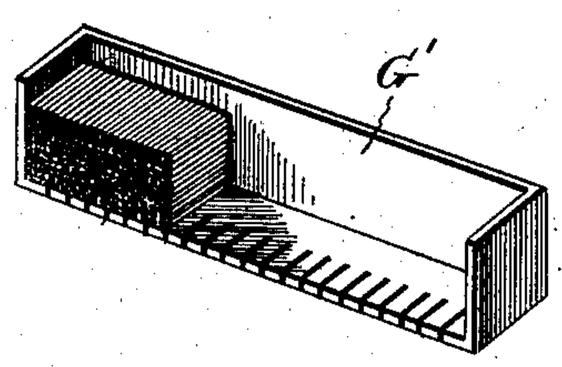


Fig. 11.

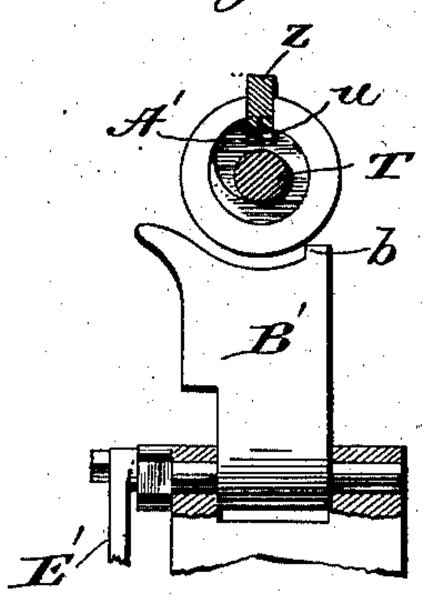


Fig. 12.

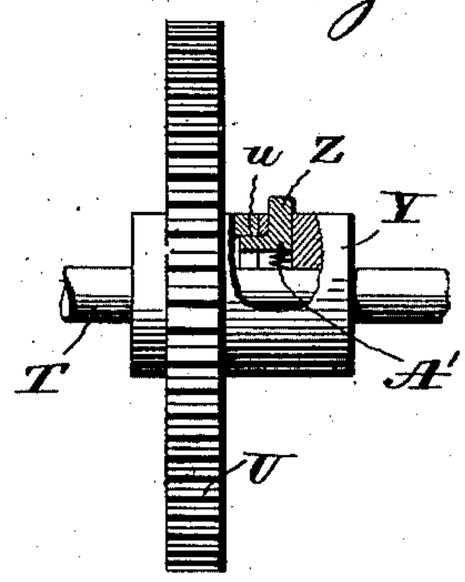


Fig. 13.

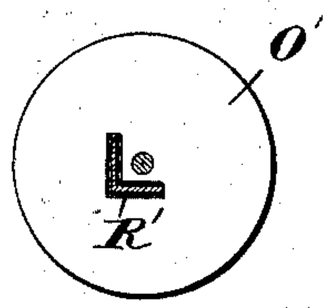
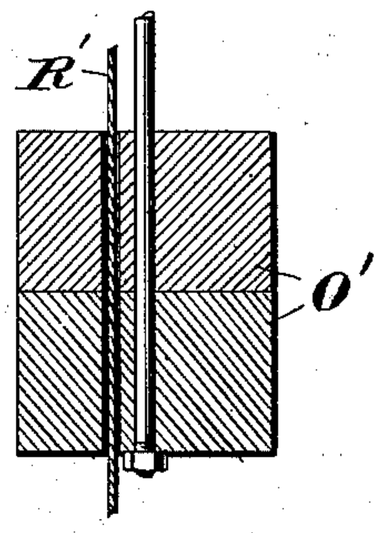


Fig. 14.



Witnesses:
Jas. E. Hutchinson.
Chas. J. Williamson

Inventor.
William E. Williams, by
Prindle and Russell, his Attys

No. 741,866. Patented October 20, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM ERASTUS WILLIAMS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE DIAMOND MATCH COMPANY, A CORPORATION OF ILLINOIS.

MACHINE FOR PUNCHING MATCHES FROM PLATES.

SPECIFICATION forming part of Letters Patent No. 741,866, dated October 20, 1903.

Application filed April 29, 1899. Serial No. 715,041. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ERASTUS WILLIAMS, of Chicago, in the county of Cook, and in the State of Illinois, have invented certain new and useful Improvements in Machines for Ejecting Matches from Plates or Holders; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a match-discharging machine embodying my invention. Fig. 2 is a top plan view of said machine. Figs. 3 and 4 are views in side elevation showing, respectively, the position of parts before and at the completion of the operation of discharging matches. Fig. 5 is a horizontal section on the line *x x* of Fig. 3. Fig. 6 is a detail view, partly in side elevation and partly in section, of the punching mechanism. Fig. 7 is a detail view, in vertical section, showing the punch-actuating means. Fig. 8 is a detail view, in horizontal section, of a portion of the punch mechanism. Fig. 9 is a detail view in perspective showing the match-plate-locking device and adjacent parts. Fig. 10 is a detail view in perspective of the tray into which the matches fall when discharged from the plate. Figs. 11 and 12 are detail views of the clutch mechanism, and Figs. 13 and 14 are detail views of the counterweight for the punch-operating mechanism.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide a machine that will automatically discharge matches from the plate or frame in which they are placed for dipping, that will do the work rapidly, and enable the matches to be delivered in an orderly condition to a holder or receiver; and to this end said invention consists of the machine having the features of construction substantially as hereinafter specified.

The machine illustrated, in which my invention is embodied, is designed for removing matches from a holder in which the splints are placed for dipping of the well-known type consisting of a plate A, having numerous holes, in each of which a splint end may be thrust and the splint thereby held. It is to be understood, however, that by suitable adaptation or modification of parts the machine may be used with holders of other types.

The plate A is held in position in the machine by having its upper and lower edges, respectively, in ways or grooves B and B in a frame C, the front or outer side of the plate being at each edge overlapped by a row of plates D and D. At the back of the plate A and supported by the frame C is a plate E, perforated with holes of the same number and relative position as the splint-engaging holes of the plate A, which holes in the plate E contain and form guides for punches F and F, that project forward from numerous independently-movable bars G and G, arranged in a vertical row transversely and in rear of the guide-plate E. Each of the bars G and G is slidably mounted on two horizontal rods H and H, that at one end are screwed into the guide-plate E and at the other end are fixed by nuts at opposite sides of the flanges *c* and *c* of the two side beams or posts of the frame C. The rearward limit of movement of the bars G and G is such that the punches are not withdrawn from the openings of the guide-plate E.

The punch-carrying bars are moved outward successively, beginning at the bottom of the row, so that the rows of matches in the plate are punched out in succession. For thus moving the bars with the punches outward in the machine illustrated there is employed a traveling frame or carriage I, that is mounted on and guided by the post-flanges *c* and *c* and carries rollers K and K, that engage the rear sides of the bars as the carriage moves upward and presses the bars outward. The rollers K and K are mounted on a shaft L, that is supported by arms *i* and *i* on the carriage. The shaft-bearings in the arms are enlarged, and on each roller is a hub *k*, which is engaged by an adjusting-plate M, which by means of screws N and N may be moved to fix the position of the rollers, and so determine the point to which the punches shall move in ejecting the matches. Gibs O and O, as is customary with sliding parts, are pro-

vided on the carriage for each of the post-flanges *c* and *c*.

For retracting the punch-carrying bars each bar at each of its ends has a stud or roller P, which engages a groove *q*, that extends in two vertical planes, with an inclined or cam portion connecting them in a bar Q, attached to and moving with the carriage, which inclined or cam portion of the groove on the descent of the bar with the carriage moves the punch-carrying bars rearward.

To raise and lower the carriage it is connected at each side by links or rods R and R with cranks S and S, respectively, on a shaft T, supported in bearings on the frame C. Placed loose on said shaft is a gear-wheel U, in mesh with a pinion V on a drive-shaft W, having a band-wheel X. Fixed to the shaft T, alongside of the hub of the gear-wheel U, is a collar Y in a radial groove, in which is an L-shaped dog Z, with one member extending radially and the other horizontally and normally pressed outward by a spring A′, so that the free extremity of the dog engages a shoulder *u* in the hub of the gear-wheel U, and thereby clutches the wheel and shaft, so that the latter may be revolved. When the dog is pressed inward, the free end of the horizontal member of the dog coincides with a circumferential recess in the gear-wheel hub, and thus the wheel is freed from the shaft. To press the dog inward a pivoted arm B′ is employed, having a cam-surface adapted by the swinging of the arm to be placed in the path of the radial member of the dog, which protrudes beyond the periphery of the clutch-collar and the dog thereby forced inward. At the rear end of the cam-surface the arm has a lug *b*, against which the dog strikes and the rotation of the shaft stopped positively, so that the parts actuated by the shaft will always come to rest in the same position. A crank C′ on the shaft D′, on which the arm is placed, is connected by a rod E′ to a treadle F′, by the operation of which the movement of the arm is produced. The treadle has a weight *f*′, that normally holds the treadle in a position where the dog-engaging arm will be kept out of position to engage the dog.

The matches as discharged from the plate are delivered to a holder, and to secure the orderly position of the matches as delivered to the latter, and so save rearrangement for packing, means are provided whereby as row after row is ejected the distance the matches have to fall after the first row will be no greater or substantially no greater in the case of ensuing rows. As shown, the matches are delivered to a temporary holder or tray G′ in the form of a box with its top and one side open, which is placed with its open side next the plate A on a vertically-movable table or support H′. The latter is supported on two rods I′ and I′, respectively, at its ends and mounted each to move vertically in a guide K′ on the side of the carriage I, its movement being simultaneous with but preferably slower than the movement of the carriage and at such rate relative to that of the latter that at all times the matches in the successively higher and higher rows will have the same distance to fall. To secure such relatively slower movement of the table H′, it is connected by links or rods L′ and L′ to cranks M′ and M′, supported by blocks N′ and N′, attached, respectively, to the cranks C′ and C′, so as to describe arcs of shorter radius than the cranks C′ and C′.

Regularity or smoothness of movement of the carriage I is insured by the provision of counterweights O′ and O′, that are respectively connected by chains P′ and P′ to the carriage at opposite sides through the grooved bars Q and Q, the chains being passed over sprocket-wheels Q′ and Q′. The counterweights are guided by vertical guide-bars R′ and R′.

Mounted on the carriage in position to pass as close to the outer face of the plate A as the thickness of the plates D and D permits is a thin steel plate S′, having its upper edge sharpened to constitute a knife to cut off any matches that may not be ejected, the cutting edge being given such position that as the carriage moves upward it will pass over a row of holes immediately after the punches have been operated to eject the matches therefrom and cut off any splints not ejected from the holes before the punches act on the next succeeding row. Thus matches not punched out are prevented from interfering with those already ejected and in the tray and those to be ejected.

Attached to the carriage I so that they engage the front side of the match-plate A are a number of thin vertical plates T′ and T′, that serve the double function of supports for the plate A under the thrust of the punches and guides or walls to prevent the matches falling awry as they drop from the plate A into the tray or holder G′. The bottom of the tray is provided with slots to pass over the plates T′ and T′.

The match-plate A is slid sidewise into and out of position in the machine, being guided by grooves in arms U′ and V′ on the frame C, that respectively engage its upper and lower edges, and when in position it is locked or held from lateral motion in either direction by vertically-movable bolts or rods W′ and W′, that respectively engage its opposite sides. Said bolts are supported and guided at their upper ends each by a block X′, secured to the frame C, and at its lower end each is attached to a treadle Y′. The two treadles are mounted on a transverse shaft Z′, and attached to each treadle is a weight *y*, that keeps the respective bolt or rod normally projected in plate-locking position. In addition to the locking rods or bolts there is at one or both sides of the machine a stop rod or bolt A^2 in the path of the plate A as it is moved along the lower guide-arm

V′ and serving to prevent a plate A being inadvertently thrust against the carriage I should the latter be in its ascent or descent at the time the attempt is made to put a plate A into the machine. The stop rod or bolt A^2 is connected at its lower end with the treadle Y′, that is on the same side of the machine, so that all of the rods or bolts are operable simultaneously, all being retracted from plate-engaging position by the depression of a treadle and restored to such position by the action of the treadle-weights when the treadle is freed.

In order to prevent the machine being put in operation before the match-plate A is in position, the treadle-shaft Z′ carries an arm B^2, which when the treadles Y′ and Y′ are depressed is interposed in the path of movement of the weight f' on the clutch-operating treadle, and thus movement of the latter to engage the clutch is prevented. Should, therefore, the treadles Y′ and Y′ be depressed to lower the stop and locking-bolts and the match-plate A be moved far enough to be over either of said bolts, so long as said plate is permitted to be over or upon the latter the treadle-shaft Z′ cannot move to raise the stop-arm B^2 out of the path of the treadle-weight f', and thus the clutch-operating treadle cannot be moved to put the match-ejecting mechanism in motion.

Should there be occasion to remove the punches F and F from any of the bars G and G, the bars Q and Q are removed, the two rods H and H, which support the bar G, whose punches are to be taken out, are removed and then said bar G moved rearward to take the punches out of the holes in the guide-plate E, and then the bar G, with the punches, is taken out endwise. By a reversal of these acts the bar may be returned to place.

Of course, though I show a match-holder having match-holding perforations that consist each of an independent hole or perforation, which necessitates ejecting means composed of series of pins, it is to be understood that I do not limit myself to any particular match-holding means and ejecting means to coact therewith. Not only in this particular, but in others, changes of construction may be resorted to without involving any departure from the principle of my invention.

Having thus described my invention, what I claim is—

1. The combination of the match-holder support, a series of match-removing devices, and a traveling means moving relative to and acting successively on said devices, substantially as and for the purposes described.

2. The combination of the match-holder support, a series of punches mounted to aline with openings in the match-holder, and traveling means moving relative to and acting successively on the punches for causing the series of punches to in succession eject matches from the holder, substantially as and for the purposes described.

3. The combination of a match-holder support, a series of punches, and a traveling, punch-operating device that is movable relative to and actuates the punches in succession, substantially as and for the purpose described.

4. The combination of a match-holder support, a series of punches, means for advancing the punches, means to retract them, and a traveling carriage that carries said punch-operating means, and moves the same relative to the punches, substantially as and for the purpose described.

5. The combination of a match-holder support, a series of punch-carrying bars, a carriage, rollers on the latter that engage the bars, and grooved bars on the carriage that are adapted to actuate the bars, substantially as and for the purpose described.

6. The combination of means for ejecting matches from a match-holder at points successively higher and higher, a vertically-movable match-receiver adapted to be moved upward as the matches are discharged at successively higher and higher points, and power-actuated means for moving said match-receiver, substantially as and for the purpose described.

7. The combination of means for ejecting matches from a match-holder, at points successively higher and higher, a vertically-movable match-receiver adapted to be moved upward as the matches are discharged at successively higher and higher points, but at a slower rate than the successive discharges, and power-actuated means for moving said match-receiver, substantially as and for the purpose described.

8. The combination of a match-holder support, a vertical series of punches mounted to aline with openings in the match-holders, means for causing the series of punches, in succession, to eject matches from the holders, a vertically-movable match-receiver, and power-actuated means for moving said receiver, substantially as and for the purpose described.

9. The combination of a match-holder support, a guideway for the holder to direct it to the support, a series of punches for discharging matches from the holder, a vertically-movable carriage adapted to actuate the punches as it moves upward, and a match-receiver moving with the carriage but at a slower speed, substantially as and for the purpose described.

10. The combination of a match-holder support, a guideway for the holder to direct it to the support, bolts for locking the holder in the support, a series of punches for discharging matches from the holder, a vertically-movable carriage adapted to actuate the punches as it moves upward, and a match-receiver moving with the carriage, but at a slower speed, substantially as and for the purpose described.

11. The combination of a plate-support, a

series of punches mounted to aline with the holes in the plate, a vertically-moving carriage, and means for actuating the punches successively as the carriage moves, substantially as and for the purpose described.

12. The combination of a plate-support, a series of punches mounted to aline with the holes of the plate, a carriage, means attached to the latter for actuating the punches successively as the carriage moves, and a match-receiver moving simultaneously with the carriage, but at a different rate of speed, substantially as and for the purpose described.

13. The combination of a plate-support, a series of bars having punches to aline with the holes in the plate, a carriage movable over said plate, means for discharging matches from the plate as the carriage travels over the same, and bearings on the carriage to engage the plate and receive the thrust due to the action of the punches in discharging matches, substantially as and for the purpose described.

14. The combination of a plate-support, locking-bolts for said plate, a series of punches mounted to aline with the holes of the plate, a carriage moving over the plate, and punch-actuating means connected with said carriage, substantially as and for the purpose described.

15. The combination of a match-holder support, a series of punches mounted to aline with the holes of the holder, a carriage, punch-actuating mechanism connected with the latter, gearing for moving the carriage, and a clutch for connecting the carriage with said gearing, substantially as and for the purpose described.

16. The combination of a match-holder support, a series of punches mounted to aline with the holes of the holder, a carriage for operating the punches and movable from one to another of the punches to actuate them in succession, an actuating-shaft geared to actuate the carriage, and a clutch mechanism for connecting said shaft with a source of power, substantially as and for the purpose described.

17. The combination of a match-holder support, means for successively discharging matches therefrom, and a knife traveling over the face of the match-holder, and movable across the match-holding means after the operation of the means for removing matches therefrom, substantially as and for the purpose described.

18. The combination of a match-holder support, a movable frame adapted to pass over the match-holder during the intervals of discharge of matches therefrom, means for successively discharging matches from said holder in advance of the travel of said frame, and a knife carried by such frame to cut off or detach matches not discharged from the match-holder, substantially as and for the purpose described.

19. The combination of a match-holder support, means for successively discharging matches from said holder, a series of bars movable over the face of the holder to different positions after successive discharge of matches and forming guides for the matches as they fall from the holder, substantially as and for the purpose described.

20. The combination of a match-holder support, a carriage, means for successively discharging matches from the holder as the carriage moves along, and a series of bars connected with the carriage, and movable thereby over the face of the holder, that form guides for the matches as they fall from the holder, substantially as and for the purpose described.

21. The combination of a match-holder support, a plurality of independently-actuated punches mounted to register with the holes in the holder, a carriage, means connected with the carriage for actuating the punches, and adjusting means upon the carriage to adjust the movement of the punches, substantially as and for the purpose described.

22. The combination of a match-holder support, means for locking the holder in its support, match-ejecting mechanism, a clutch for connecting the latter with a source of power, means for operating the match-holder-locking means, and a device to prevent operation of the clutch, said device being actuated by the means for operating the match-holder-locking means, substantially as and for the purpose described.

23. The combination of a match-holder support, a series of punches to discharge matches therefrom, a carriage, punch-actuating mechanism connected with the carriage, a knife connected with the carriage for cutting any matches that are not discharged by the punches, and a series of bars connected with the carriage that form guides for the matches as they fall from the holder, substantially as and for the purpose described.

24. The combination of a match-holder support, a series of punch-carrying bars having punches to aline with the holes of the match-holder, a carriage, rollers on the latter to engage the punch-carrying bars, and bars connected with the carriage having punch-engaging grooves to retract the punches after they have been moved forward by said holders, and to hold them in a retracted position, substantially as and for the purpose described.

25. The combination of a match-holder support, a series of punches mounted to register with the holes in the holder, a carriage, punch-operating means connected with the carriage, a carriage-moving shaft, and cranks on said shaft connected with the carriage, substantially as and for the purpose described.

26. The combination of a match-holder support, a series of punches mounted to aline with the holes of said holder, a carriage, punch-operating means connected with the carriage, a shaft having cranks connected with the carriage, a match-receiver, and a crank mechan-

ism for moving the match-receiver, substantially as and for the purpose described.

27. The combination of a match-holder support, a series of punches mounted to register with the holes of the holder, a carriage, means whereby the travel of the carriage actuates the punches, and a counterbalance for the carriage, substantially as and for the purpose described.

28. The combination of a match-holder support, means for locking the holder therein, match-ejecting mechanism, gearing for operating the latter, a clutch to connect said gearing with a source of power, and means for preventing the operation of the clutch while the holder-locking means are out of locking position, substantially as and for the purpose described.

29. The combination of a match-holder support, a series of punches to register with the holes of the holder, bar-actuated, punch-operating mechanism, means for locking the match-holder in its support, means for connecting the punches with said bar-actuated mechanism, means for operating the match-holder, locking means, and a locking device connected with said locking means, whereby when the locking means is partially operated the punches will be prevented from connection with the source of power for operating them, substantially as and for the purpose described.

30. The combination of a match-holder support, a series of punch-carrying bars, a guide-plate for the punches, bolts passing through openings in the punch-carrying bars, and attached to the punch-guiding plate, and a reciprocating device that moves the bars forward successively as it moves in one direction, and successively restores them to position as it moves in the opposite direction, substantially as and for the purpose described.

Signed by me at Chicago this 18th day of April, 1899.

WILLIAM ERASTUS WILLIAMS.

Witnesses:
ROBERT WEIR,
BLANCHE FERN.