(No Model.) 12 Sheets—Sheet 1.

E. M. LOCKWOOD & W. M. PATTERSON.

MACHINE FOR BOXING MATCHES.

No. 564,310. Patented July 21, 1896.

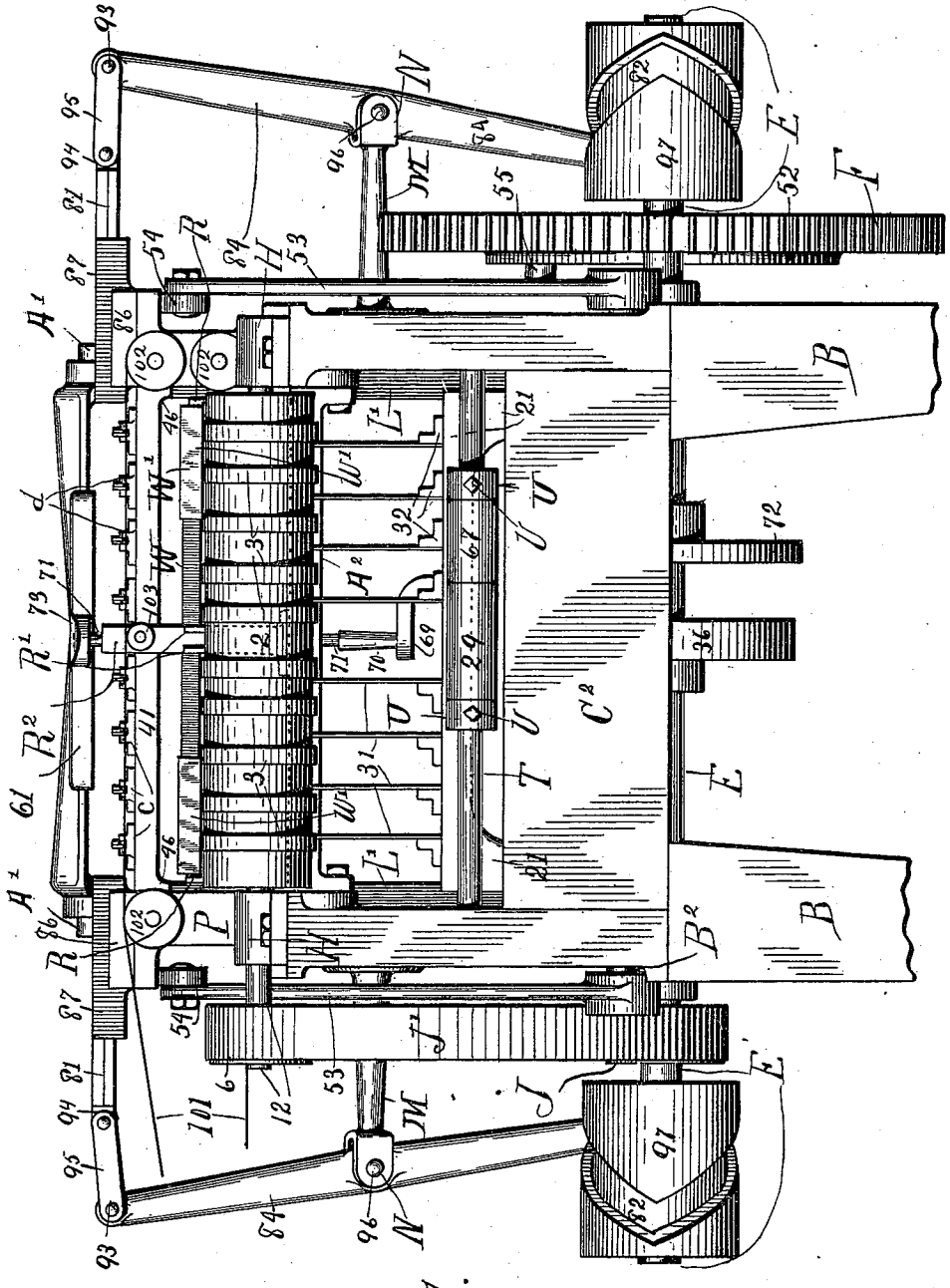

Fig. 1.

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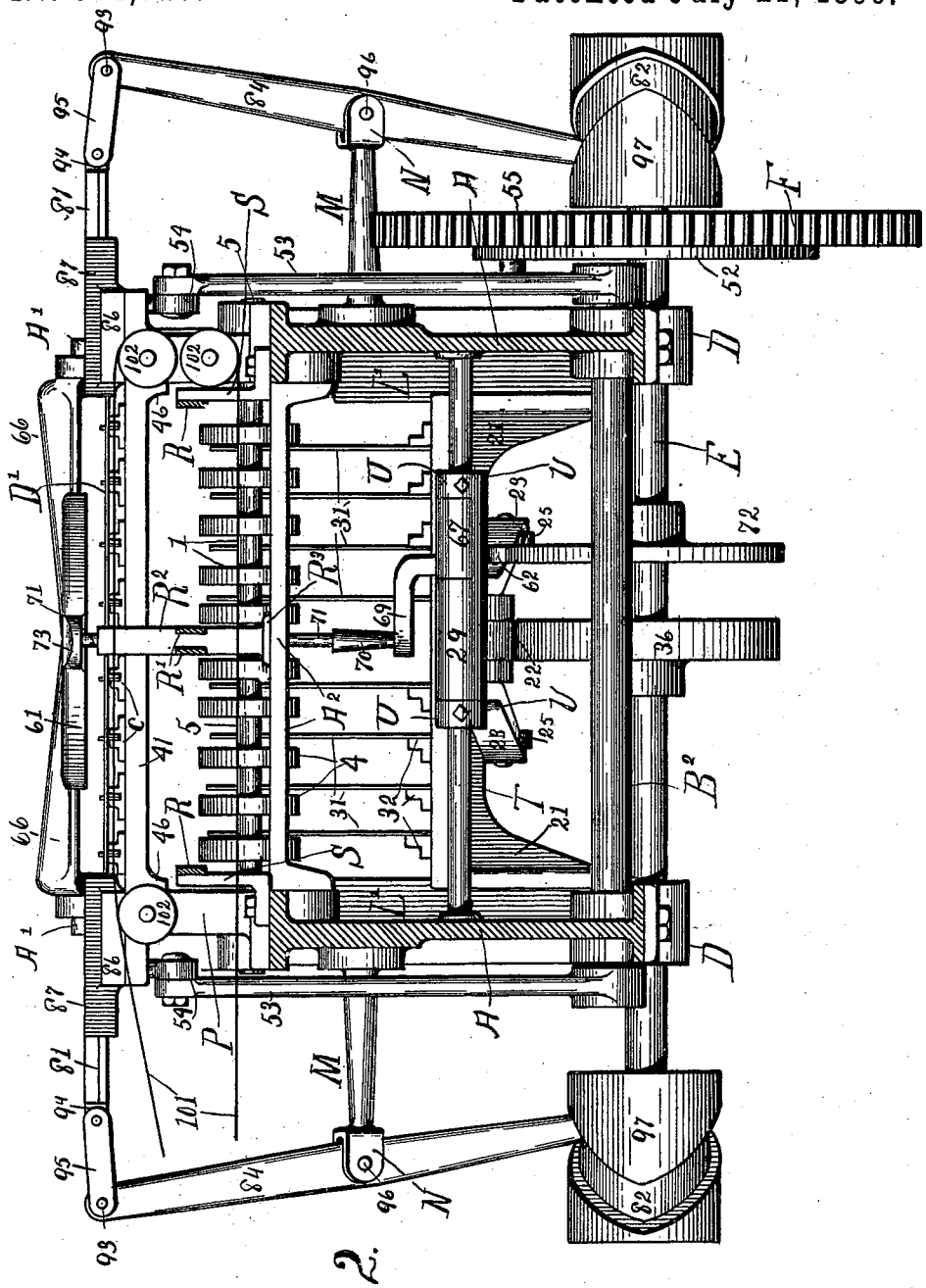

Fig. 2.

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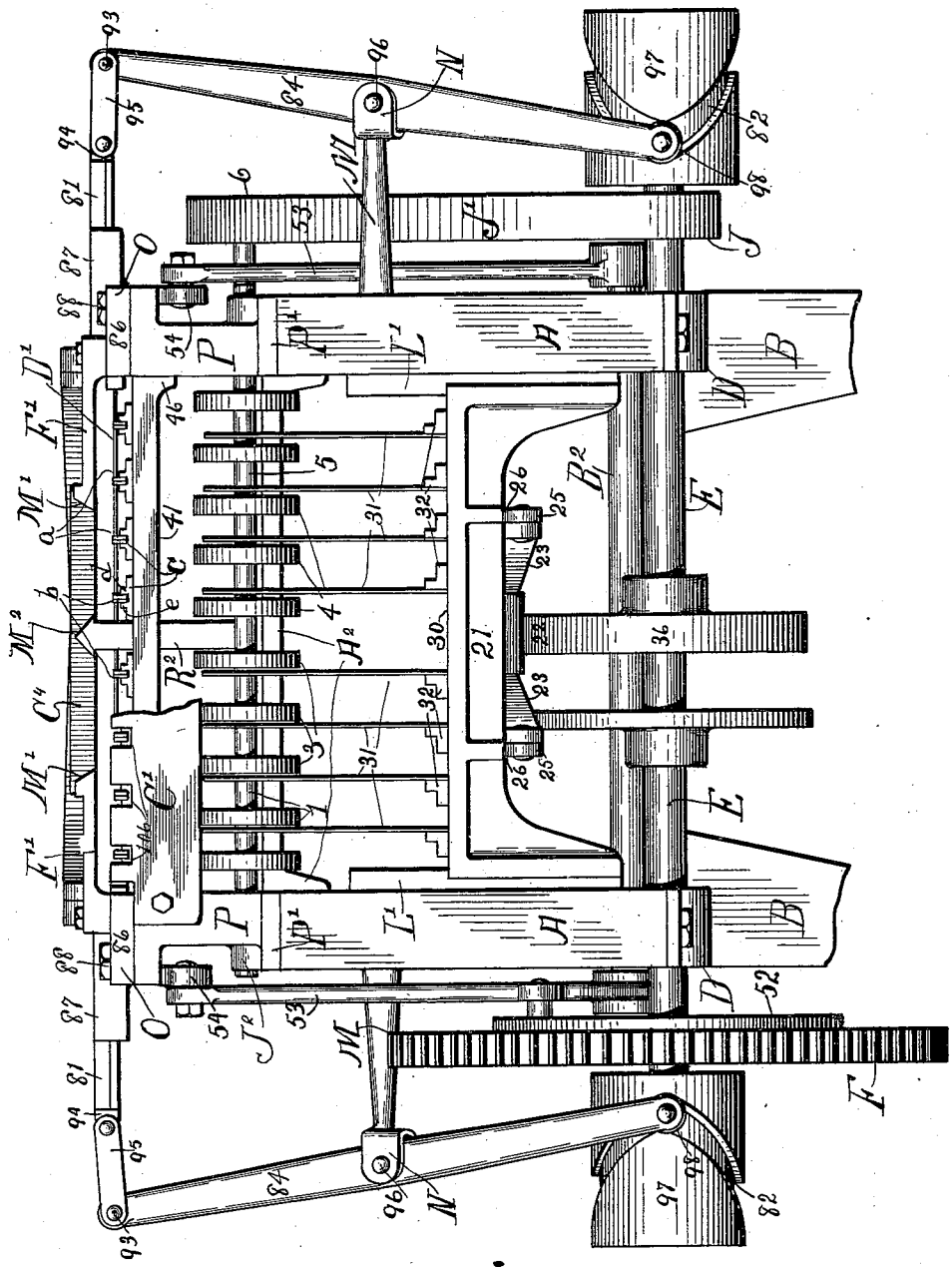

Fig. 3.

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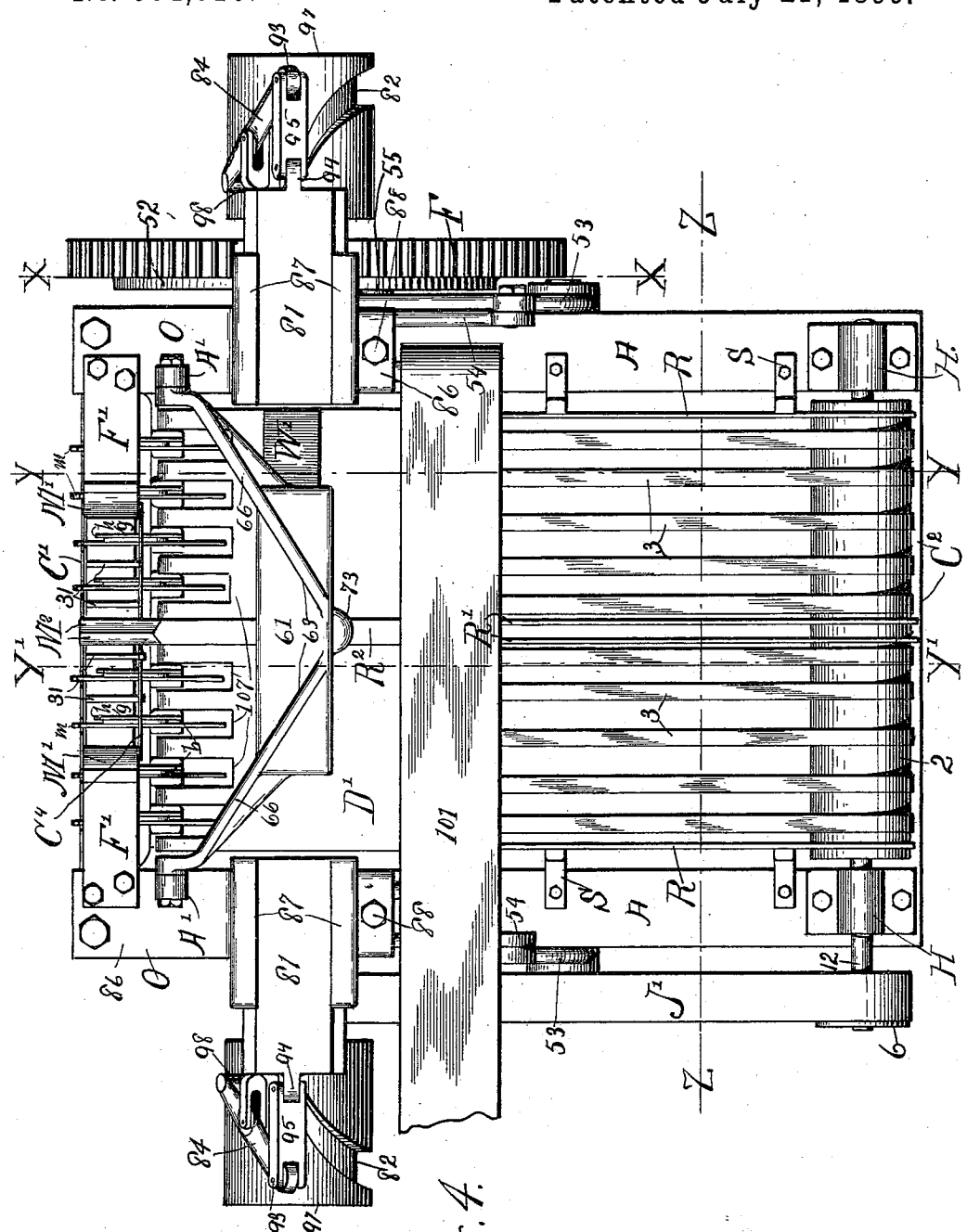

Fig. 4.

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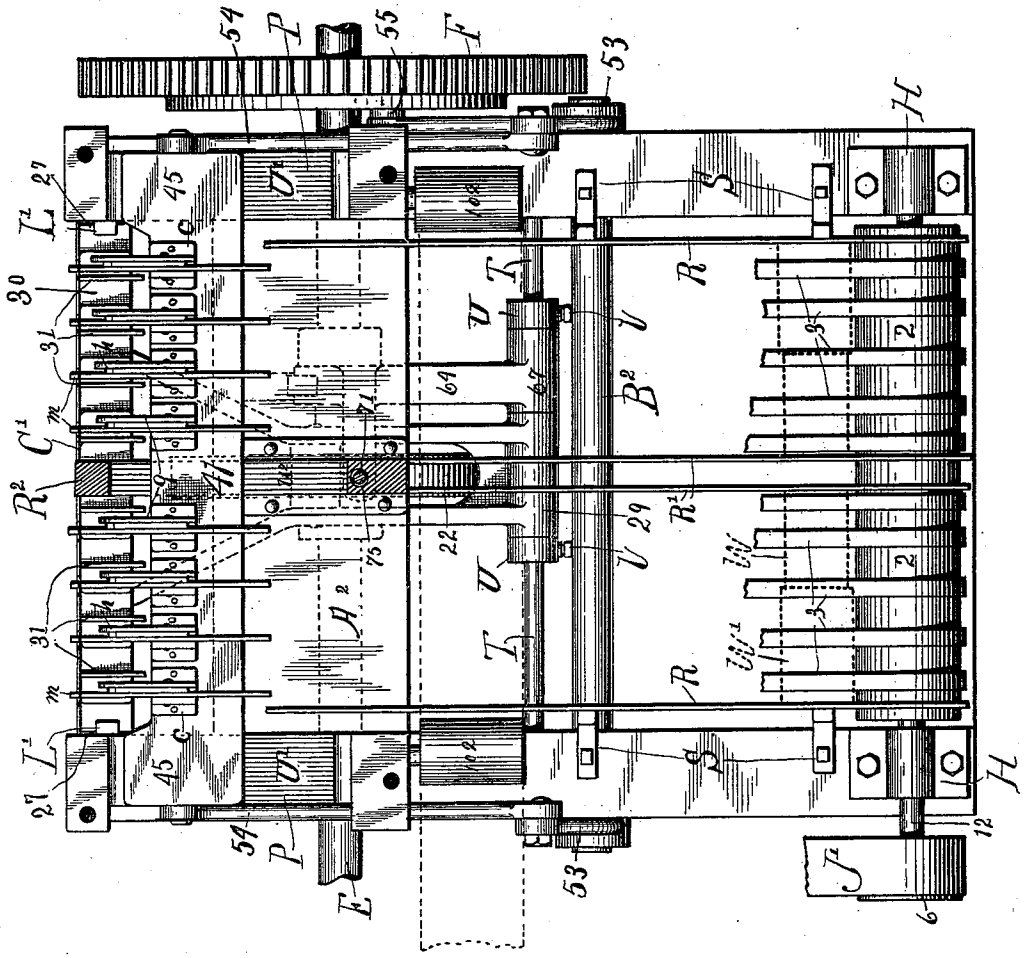

Fig. 5.

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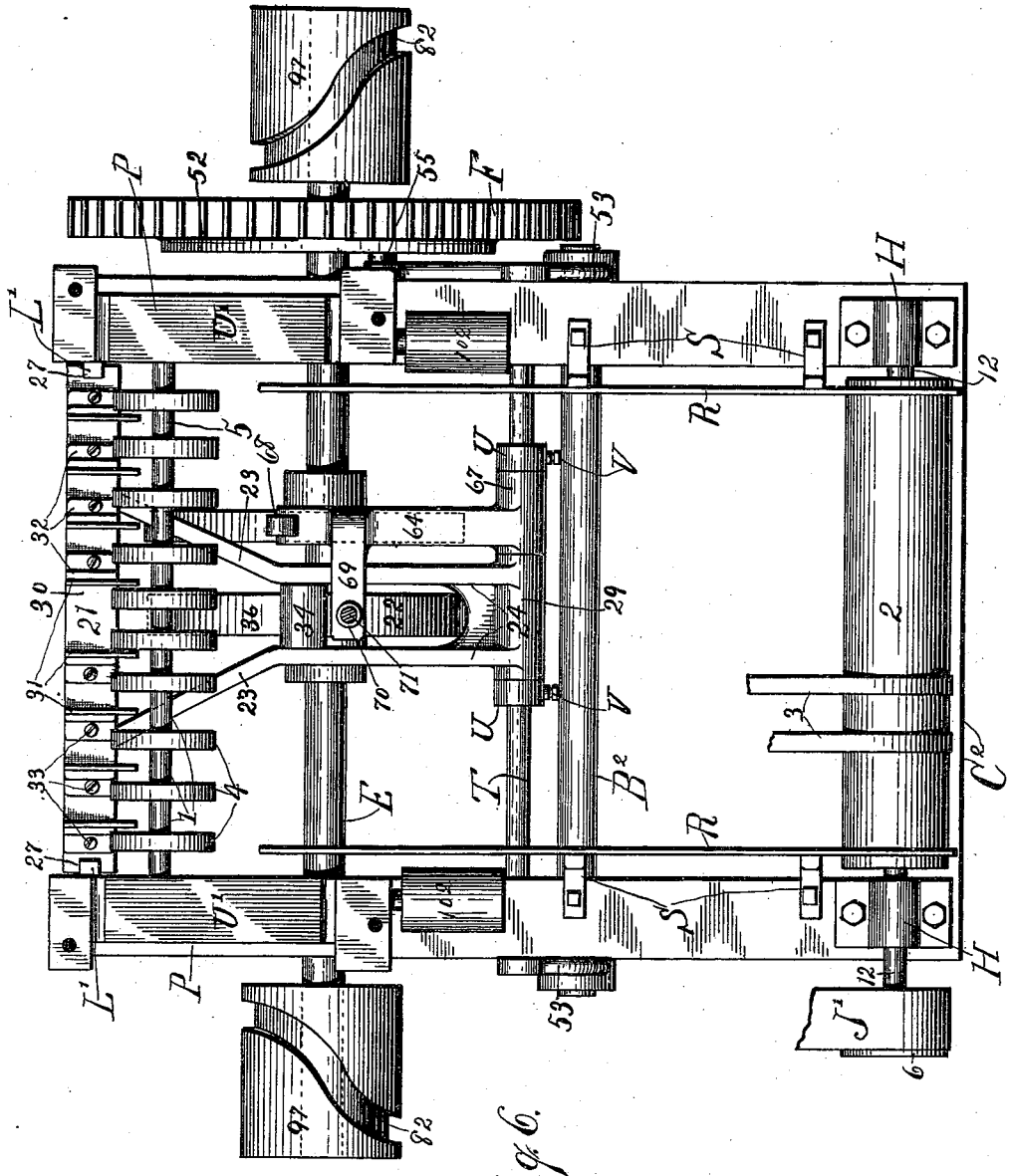

Fig. 6.

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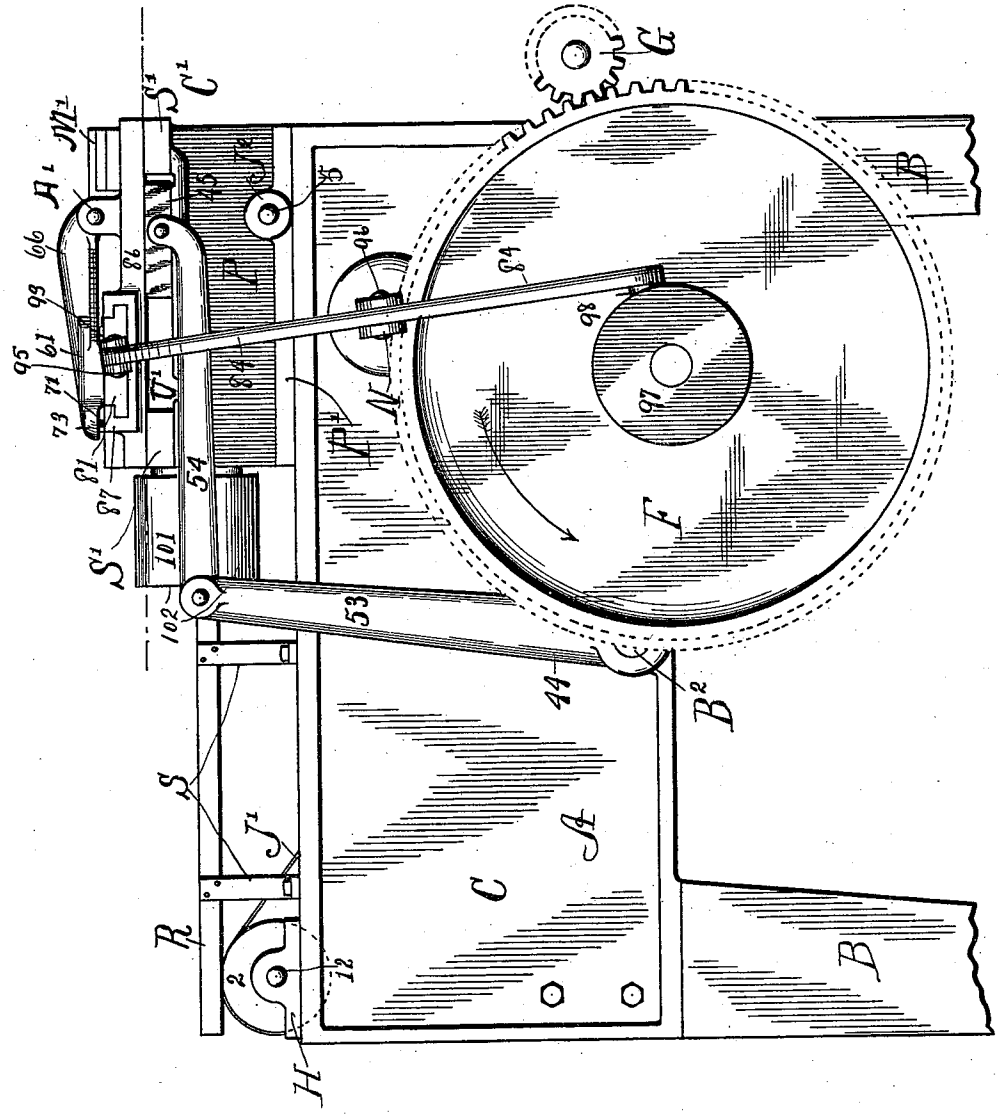

Fig. 7.

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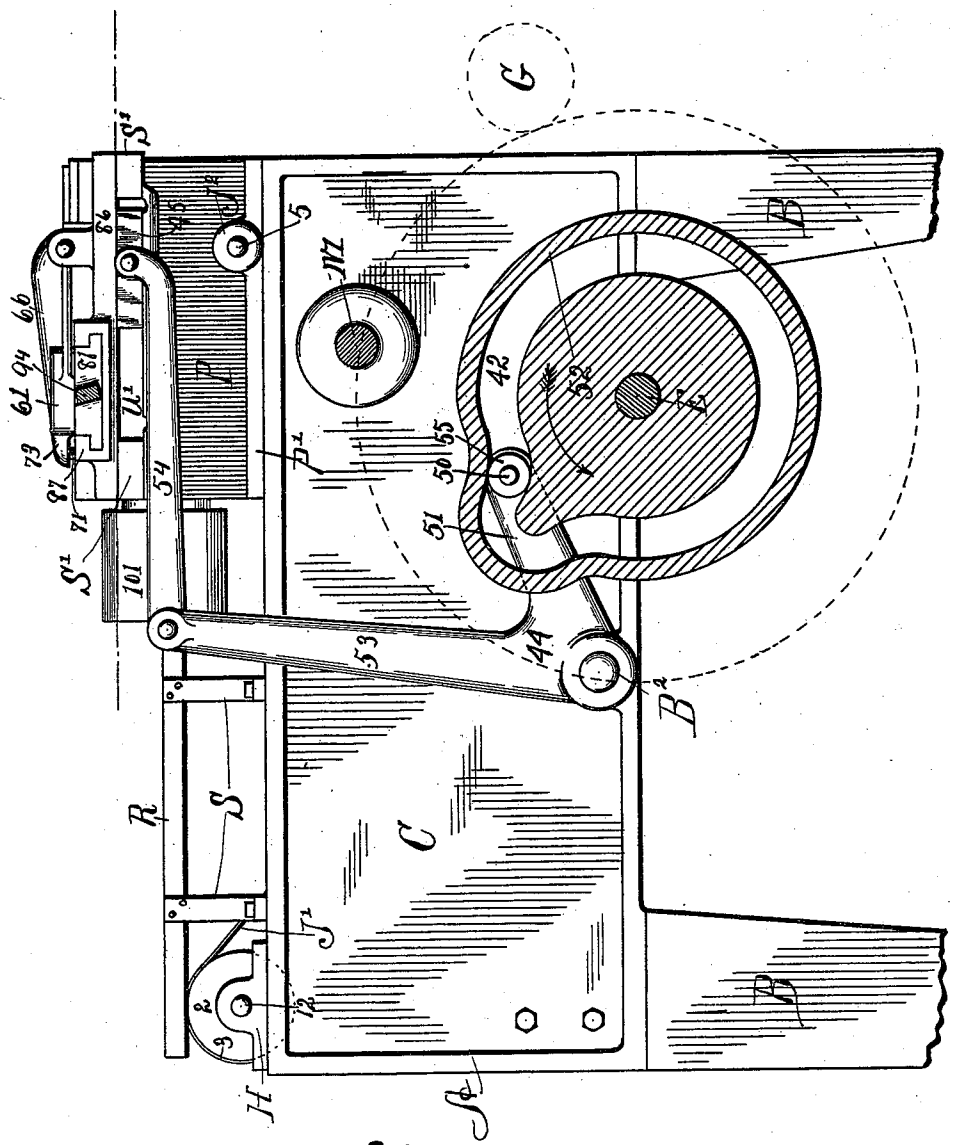

Fig. 8.

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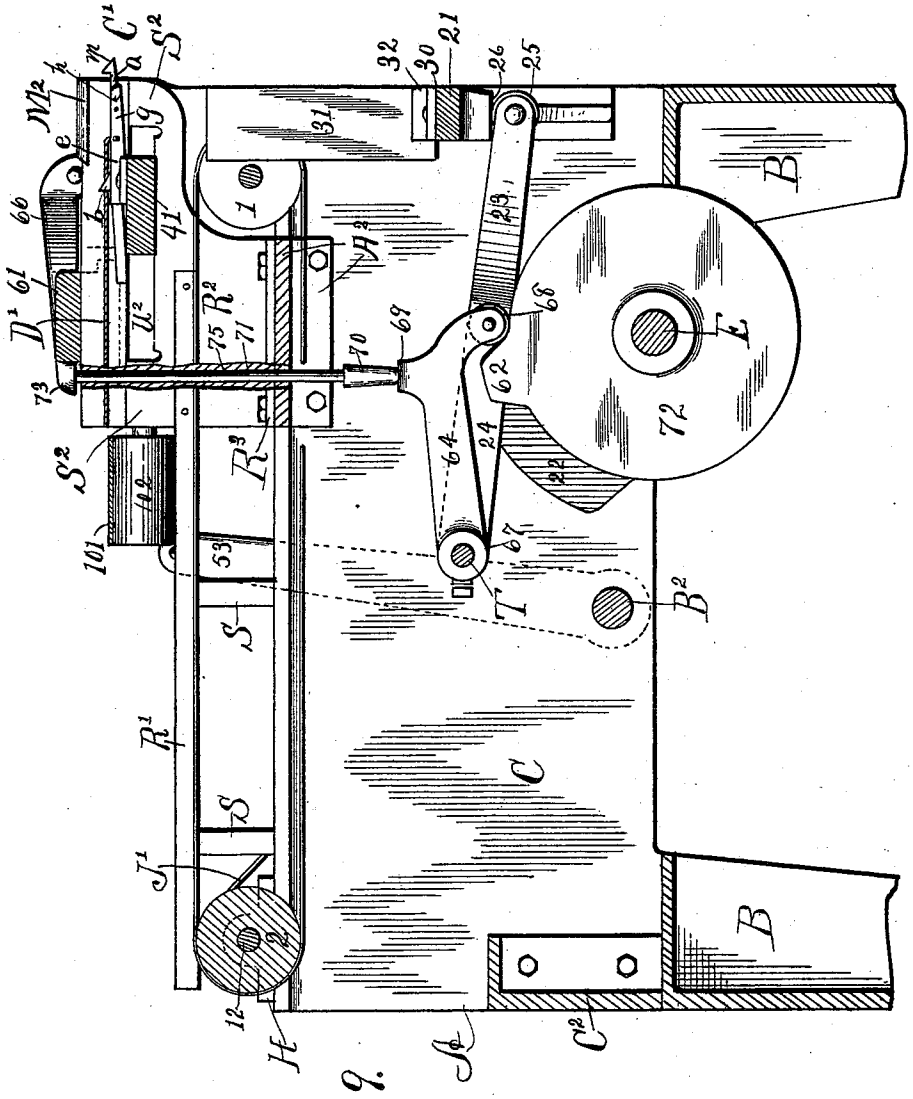

Fig. 9.

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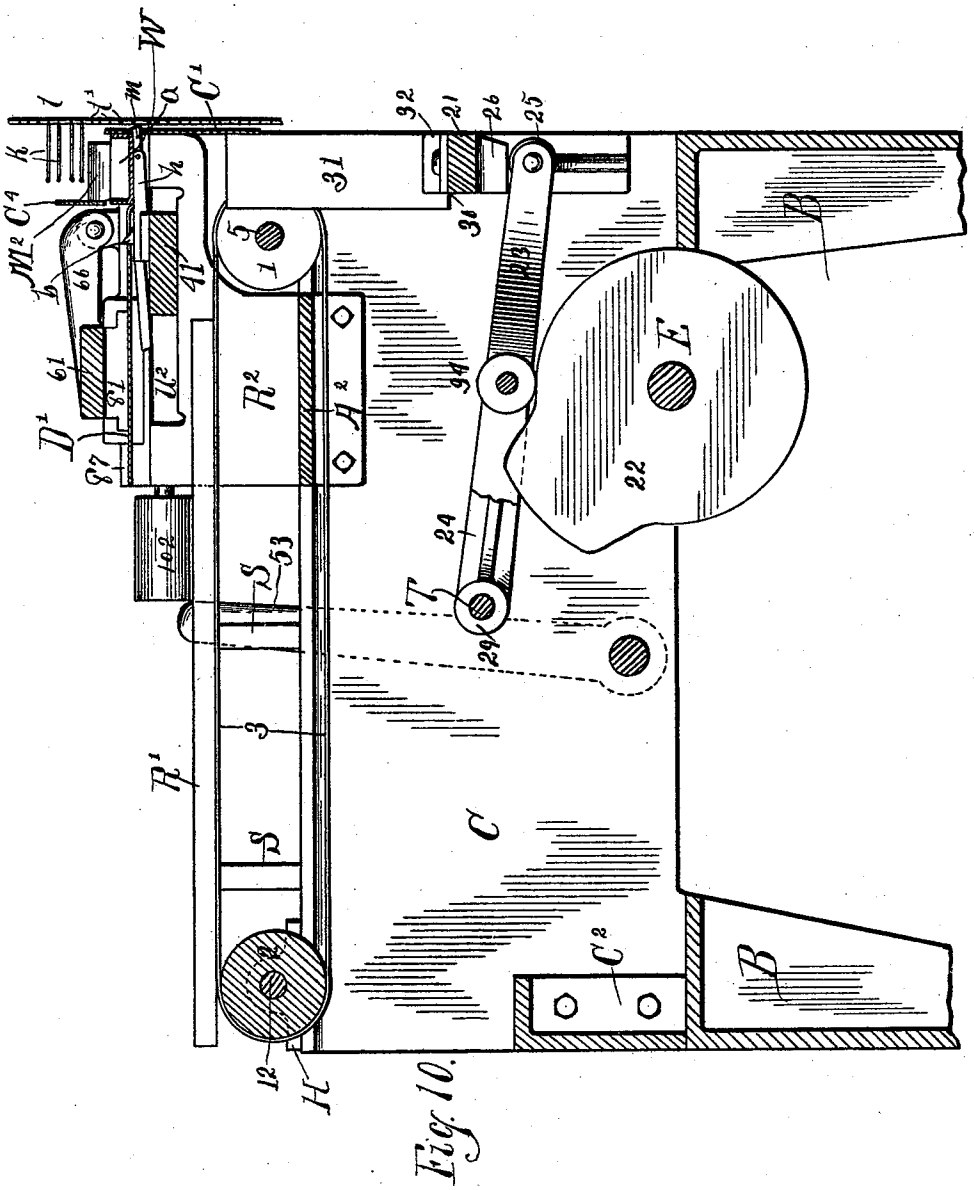

Fig. 10.

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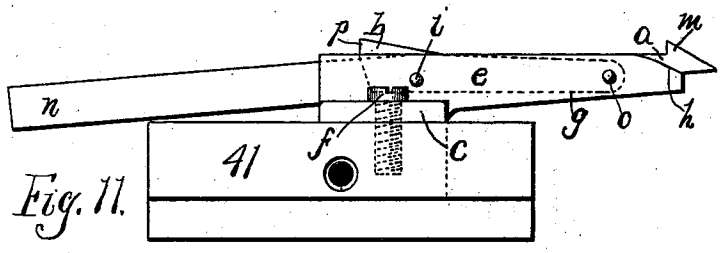

Fig. 11.

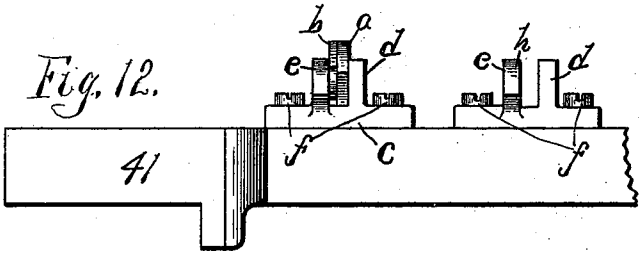

Fig. 12.

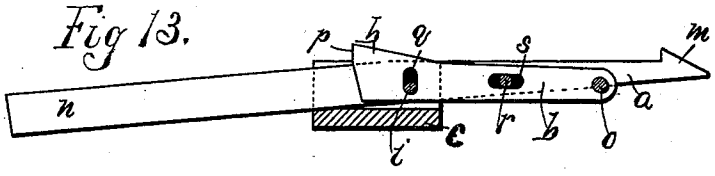

Fig 13.

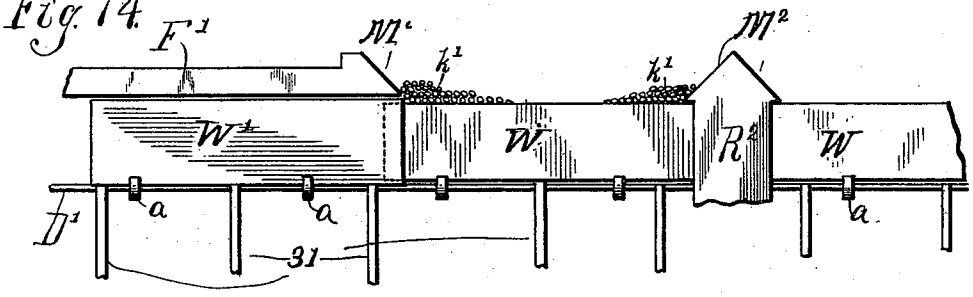

Fig. 14.

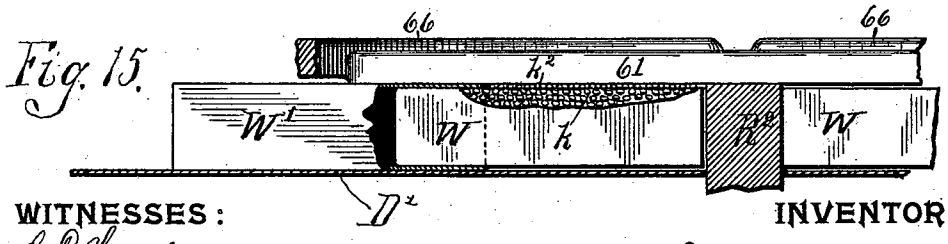

Fig. 15.

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MACHINE FOR BOXING MATCHES.

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Fig. 16.

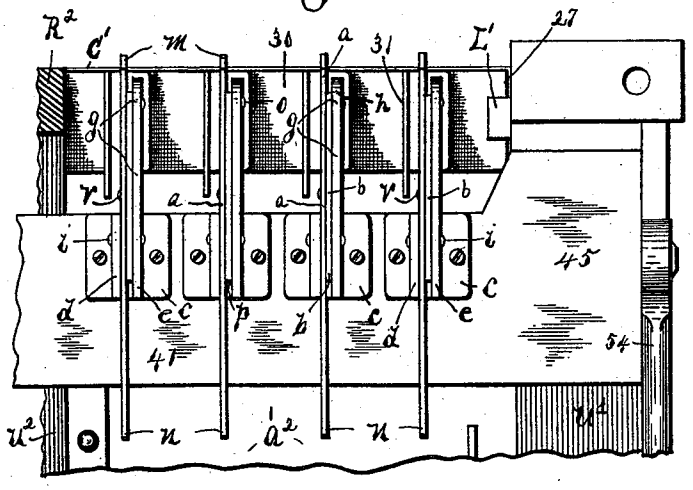


Fig. 17.

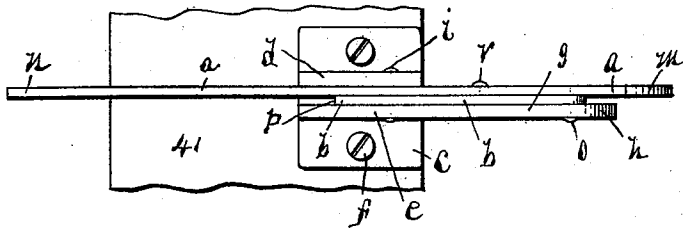


Fig. 18.

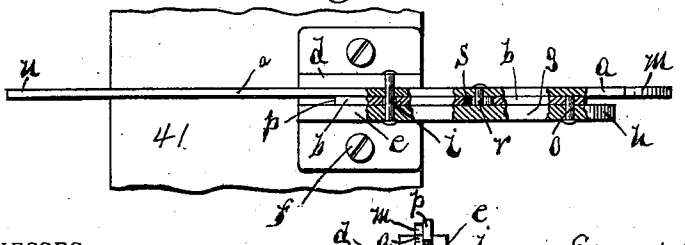
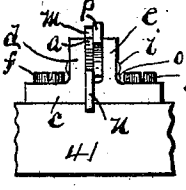


Fig. 19.



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William M. Patterson
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Alfred Wilkinson
ATTORNEY.

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UNITED STATES PATENT OFFICE.

EDWARD M. LOCKWOOD AND WILLIAM M. PATTERSON, OF OSWEGO, NEW YORK, ASSIGNORS OF TWO-THIRDS TO WILLIAM A. POUCHER, ISAAC B. POUCHER, AND THE ESTATE OF RICHARD J. OLIPHANT, OF SAME PLACE, AND GEORGE O. SEWARD, OF TRENTON, NEW JERSEY.

MACHINE FOR BOXING MATCHES.

SPECIFICATION forming part of Letters Patent No. 564,310, dated July 21, 1896.

Application filed September 19, 1895. Serial No. 563,007. (No model.)

To all whom it may concern:

Be it known that we, EDWARD M. LOCKWOOD and WILLIAM M. PATTERSON, citizens of the United States, residing at Oswego, in the county of Oswego and State of New York, have invented a new and useful Machine for Boxing Matches; and we do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description of the invention.

Our invention relates to the construction of certain novel automatic machinery for filling the ordinary tubular or slide match-boxes with matches, and to the combination and arrangement of the various parts of said automatic machinery in such manner that the various steps of the process of introducing, filling, closing, and removing the boxes will be carried on in regular and continuous order.

Our invention will be better understood by reference to the accompanying drawings, in all of which the same letters and figures have reference to corresponding parts.

Figure I is a rear elevation of my machine. Fig. II is a vertical cross-section on line Z Z of Fig. IV. Fig. III is a front elevation with a portion broken away. Fig. IV is a top plan view. Fig. V is a top plan view with the closing slide-brackets and the bed-plate removed and the endless tapes broken away. Fig. VI is a top plan view with the retracting-slide, operating-arms, and cross-plate removed. Fig. VII is a side elevation. Fig. VIII is a side view on line X X of Fig. IV, partly in section. Fig. IX is a longitudinal vertical section on line Y Y of Fig. IV. Fig. X is a longitudinal vertical section on line Y′ Y′ of Fig. IV. Fig. XI is an enlarged side elevation of horizontal slide and retracting-hooks. Fig. XII is a front elevation of a portion of retracting-slide, showing supports for hooks. Fig. XIII is a side view of retracting-hooks, a portion of the support being broken away. Fig. XIV shows the boxes in position under the inclined filling-planes, showing the position of the matches therein. Fig. XV shows the filled boxes under the leveler. Fig. XVI is an enlarged view of a portion of Fig. V, showing four pairs of retracting-hooks in position on the retracting-slide. Fig. XVII is a top plan view of one pair of retracting-hooks and their supports. Fig. XVIII is a similar view, a portion being broken away. Fig. XIX is a rear elevation of one pair of retracting-hooks on the supports therefor.

The machine as here shown is made double, so that two boxes may be operated upon simultaneously.

For convenience and clearness we will proceed to describe our improved machine under several heads, as follows: First, the main frame of the machine, the supports for the operative parts, and means for operating the same; second, the mechanism for carrying in the boxes; third, the mechanism for elevating the boxes; fourth, the mechanism for retracting the boxes; fifth, the leveling mechanism; sixth, the mechanism for closing the boxes, and, seventh, the means for removing the boxes after they have been filled and closed.

First. The main frame of the machine, the supports for the operative parts, and means for operating the same.—The letter A indicates the main frame of the machine, preferably made of cast-iron, with legs B B, side plates C C, face-plate C′, and back plate C^2. The main shaft E, by which motion is communicated to all parts of the machine, is journaled to frame A in bearings D D. To shaft E is keyed the driving-wheel F, meshing with pinion G, by which or by some similar means motion is communicated to the machine. To shaft E are also keyed various cam-wheels, by which certain parts of the mechanism are put in operation. In addition to face and back plates C′ and C^2, frame is braced by cross-plate A^2 and tie-rod B^2. To frame A, at H H, is journaled roller 2, which is operated by belt J′, running from pulley 6, keyed to shaft 12, to pulley J, keyed to main shaft E. Frame is also braced by rod T, extending from side to side thereof and supporting certain operating-levers. For holding boxes and covers in place on endless tapes 3 3 3, the guards R R are provided on each side, and the center

guides R′ R′, extending rearwardly from center rib R^2. This center rib R^2 extends forwardly and is sustained by its widened base R^3 on cross-plate A^2, and on it are set at its forward end the central inclined planes M^2. These inclined planes M^2 may be integral or not with rib R^2.

On the outer sides of frame A are firmly attached arms M M, supporting closing-arms 84 84, and to outer ends of rod B^2 are journaled the retracting-levers 44 44. On the main frame of the machine and toward the front are set on each side the brackets P P, to which are journaled at J^2 J^2 the front roller 1. These brackets are best shown in Figs. III, V, VI, VII, and VIII. Each of these brackets P P is provided with a widened base P′, which gives a good support, and with widened upper portions S′ S′, on which rest the brackets O O, and between which portions S′S′ the bracket P is cut out, leaving the groove U′ U′, in which slides the end 45 of the retracting-slide 41. Rib R^2 is provided with corresponding groove U^2, between its upper extensions S^2 S^2. To rear faces of brackets P P are journaled the rollers 102 102, and to rear face of center rib R^2, if desired, the idler 103, on which runs the carrying-out belt 101. On the brackets P P are set and firmly secured the brackets O O, which cover over grooves U′ U′. To brackets O O is secured bed-plate D′, having slots 107 in forward edge, admitting hooks, and to ears A′ A′, arranged near the forward ends of brackets O O, the leveler 61, by its arms 63 63. On brackets O O, at their forward ends, are attached carrier-arms F′ F′, which carry at their inner ends inclined planes M′ M′, corresponding to planes M^2 M^2. Bolted to front of machine is face-plate C′, shown partly broken away in Fig. III. This acts as a stop to the forward motion of the boxes and is provided with slots 106, through which the forward hook projects.

Second. The mechanism for carrying in the boxes.—This consists of endless tapes 3 3 3, running on rollers 1 and 2, of which the rear roller 2 is solid, and the front roller 1 is formed of shaft 5, and disk-like sections 4 4, proportioned to the width of the tapes 3 3, roller 1 being journaled to the brackets P P at J^2 J^2 and the roller 2 to frame A in bearings H H. These rollers 1 and 2 and endless tapes 3 3 3 are operated as aforesaid by belt J′, extending from pulley J to pulley 6. The front roller 1 is made in this form that the lifting-blades 31 31 may pass up between the sections 4 4 and receive the boxes with their covers as they are carried forward on tapes 3 3. The boxes W with their covers W′, as shown in Figs. I and V, are set in place on the tapes 3 3 3 over the roller 2, one on each side, between the guard R and the center guide R′, the distance between guard R and guide R′ being preferably a trifle less than the combined length of the box W and cover W′, so that when set in place on the tapes 3 3 3 the box extends into the tubular cover a short distance. The box and cover, being set in place on the tapes 3 3 3, are carried forward on this level into the machine until they arrive at the end of these belts over the roller 1, where their forward motion is positively stopped by face-plate C′, and where they are in position to be received on the lifting-blades 31 31 31 and elevated to the upper level of the machine, which is the level of the bed-plate D′. When they arrive at this level, they are immediately under the sloping planes M′ M′ and M^2 M^2 and in position to be filled. This elevation of the boxes to the filling position on the upper plane is effected by,

Third. The mechanism for elevating the boxes up to the inclined planes.—This consists of the double-arm lever 24, provided with two arms 23 23, extending forwardly from its integral portion, this lever being mounted freely on the cross bar or rod T by its rearward sleeve 29, so that forward ends of arms 23 23 of said lever 24 are free to move up and down through the arc of a circle. Lateral movement of lever 24, as well as of the curved operating-lever 64 of the leveling mechanism, is prevented by collars U U, set firmly on rod T by set-screws V V. Elevating-slide 21 has ends 27 27 grooved to fit tongues L′ L′ on frame A, so that slide 21 may run up and down vertically on these guides. Elevating-slide 21 has a flat upper surface 30, on which are set the narrow vertical lifting-blades 31 31 31, which operate vertically between the sections 4 4 4 of roller 1. These blades 31 31 31 are firmly secured in position by angle-irons 32 32 and bolts 33 33. The upward motion of elevating-slide 21 is communicated by cam 22, which is an integral portion of cam-wheel 36, keyed to shaft E and rotating therewith. In its rotation cam 22 bears against antifriction-roller 34, pivoted between arms 23 23 of lever 24, and forces upward forward end of lever 24, provided with antifriction-rollers 25 25 against the bearings 26 26 on the under face of slide 21, thus elevating slide 21, blades 31 31, and boxes carried thereon, slide 21 with blades 31 31 dropping by gravity when cam 22 has passed under roller 34.

Fourth. Retracting mechanism.—This consists of a slide 41, extending from side to side entirely across the machine, and having ends 45 45, which are fitted to slots U′ U′ in bracket P, so as to slide therein. Slide 41 is also provided on its lower face with guides 46 46, which bear against inside faces of said brackets P P. On the upper surface of the retracting-slide 41 are set and secured the hook-supports *c c c*, formed each with two upwardly-extending arms *d d d* and *e e e*, and secured in place by bolts *f f f*. Arms *e e e* are provided with forward extensions *g g g*, whose forward ends are slightly curved downward at *h h h*, and between arms *d* and *e* on each support *c* are pivoted one pair of the retracting-hooks *a* and *b*. In our drawings hook *a* is shown arranged next to arm *d* and hook *b* next arm *e*. Hook *a* is pivoted between the

arms by pivot *i*, its hooked end *m* extending a little forward of the curved end *h* of arm *e*, and its end *n* extending rearwardly and acting as a counterpoise slightly to overbalance the hooked end *m* and to keep it normally elevated, and at the same time as a counterpoise to hook *b*, keeping its rear end *p* elevated, the weight of end *n* being so proportioned that when slide 41 is run forward under a box, end *m* and end *p* will be easily depressed. The second retracting-hook *b* lies next to arm *e* and is journaled thereto by rivet *o* at its forward end. Its rear end slants upwardly toward the rear, extending slightly above arms *d* and *e*, having a vertical rear face *p*, which acts as a hook for the purpose of retracting secondarily the boxes and covers, which have been first retracted by hook *a*. Near its rear end *p* hook *b* is provided with a slot *q*, in which rests the journaling-pivot *i* of hook *a*, so that the hook end *p* can vibrate up and down freely for a short distance. Hook *a* is provided with a pin *r*, which engages in the longitudinal slot *s*, provided in hook *b* at about its center, so that when either of the hook ends *m* or *p* is depressed the other will be depressed simultaneously. The purpose of slot *s* is to prevent binding. Slide 41 is connected by bar 54 to upper member 53 of retracting-lever 44, bar 54 being connected freely to both slide 41 and member 53 53. To forward end of lower member 51 of lever 44 is attached a pin 50, provided with antifriction-roller 55, engaging with cam-groove 42 on inner face of cam-wheel 52, keyed to E and rotating therewith. As wheel 52 rotates, an up-and-down motion is imparted to pin 50, by which through retracting-lever 44 and bar 54 a reciprocating horizontal longitudinal movement is imparted to slide 41, and therefore two retracting-hooks *a* and *b*, carried thereon. By this means boxes and covers elevated on blades 31 31 to level of bed-plate D′ are received on hooks *a a* and supports *d d*, with the open boxes immediately under inclined planes M′ M′ and M² M², and, having been filled with matches in this position, are retracted first by hooks *a a*, which take with forward side of box, and second by hooks *b b*, being thereby held against retrograde movement upon the return of the hooks, and supported on bed-plate D′ immediately under leveler 61.

Fifth. Mechanism for leveling the matches.—The leveler 61, which is provided for leveling and slightly compressing the matches in the boxes and holding the boxes and covers in place while they are being closed, is a rectangular plate smooth on its under side and faced with leather, felt, or other suitable substance. It is large enough completely to cover the pair of filled boxes as they rest in the machine after being retracted and extends over a portion of the covers. Leveler 61 is carried by its two arms 66 66, journaled to ears A′ A′ on bracket O, which arms extend along the top of 61 to the middle of its rear edge in the form of ribs 63 63. The leveler is operated by cam 62 on cam-wheel 72, which bears against the antifriction-roller 68, pivoted on forward end of curved operating-arm 64. This arm is journaled by its rear sleeve 67 to cross-rod T, so that its forward end may freely vibrate up and down through an arc. Attached to the upper and inwardly-curved end 69 of arm 64 is a socket 70, in which rests the lower end of vertical rod 71, running through perforation 75 in the middle rib R². The upper end of rod 71 rests against a rearwardly-extending ear 73 of the leveler 61, so that when rod 71 is forced up by cam 62 this motion is communicated to the leveler 61, which is thus slightly raised above the boxes of matches, permitting them to pass under, and again descending on them, by its weight levels and slightly compresses the matches in the boxes and holds the boxes and covers in place while they are being closed by slides 81 81. The necessity for the leveler 61 and its mode of operation are best illustrated in Figs. XIV and XV. The matches *k*, held in the holes *l′* in endless belt *l* of the match-making machine, (indicated in Fig. X,) are brought into position so as to extend immediately over the box W and inclined planes M′ M²; then, ejected from belt *l*, they fall some directly into box W, some first onto planes M′ M², thence into box, where they lie substantially parallel, but a little piled up, *k′ k′*, at each end of the box, as shown in Fig. XIV. When the box has passed under the leveler 61, its weight forces these piles *k′ k′* down substantially level, as shown in Fig. XV. The upper layer of matches *k²* may still lie slightly above the edge of the box, but the cover W′, the box W, and the matches *k* being held firmly in position by the leveler 61, the cover is forced over this upper layer *k²* and onto the box without difficulty.

Sixth. Box-closing mechanism.—On top of each bracket P on each side of the machine is secured firmly by bolts 88 88 a bracket O, consisting of a base 86, extending longitudinally, forming the bed of the bracket. On this bed and at right angles thereto is the guiding-piece 87, extending outwardly and inwardly beyond sides of base 86 and preferably integral therewith. This guiding-piece is formed on its interior with grooves and lips to which slide 81 is fitted, and on which it runs with a reciprocating lateral horizontal motion. On bracket O, forward of guiding-piece 87, is the ear A′, to which arm 66 of leveler 61 is pivoted, and farther forward is supported on bracket O the carrying-arm F′. The reciprocating motion is communicated to slide 81 by closing-lever 84, supported near its middle by pin 96 in forked end N of lever M. At its upper end closing-arm 84 is pivotally connected by link 95 to extension 94 on outer end of slide 81, and at lower end is provided with antifriction-roller 98, which rests in eccentric-groove 82 on roller 97, carried on outer end of main shaft E and rotating there-

with. As roller 97 rotates, the antifriction-roller 98 follows eccentric-groove 82, and reciprocating horizontal motion through closing-lever 84 is thus communicated to slide 81.

Seventh. Carrying-out mechanism.—The boxes having been leveled, closed, and pushed back in the machine by the boxes, which are being continually retracted, are pushed onto the carrying-out belt 101, which is an endless belt running on rollers 102 102 102, and on some outside roller at its outer end, (not shown,) and may be supported at its center by an idler 103. This belt 101 carries the boxes off to one side of the machine, where it delivers them over its outer end into some suitable receptacle.

Mode of operation.—The empty boxes W with their covers W′ are set in position by the operator on the endless tapes or belts 3 3 3, as shown in Figs. I and V, the box W being set in the inside against guide R′, and the cover on the outside against guard R, the distance between guide R′ and guard R being a little less than the combined length of the box and cover, so that the box and cover being set together on endless belts, the end of box extends a short distance into the cover. The boxes, being set on the tapes one after the other, are carried forward by the movement of the tapes until they arrive at the front of the machine immediately over the elevating mechanism, where further forward movement is prevented by face-plate C′. The box and cover are there in position to be received on the elevating-blades 31 31 31, and are elevated to the upper level—the level of the bed-plate D′—by the elevating mechanism, which is put into operation by cam 22, whose wheel 36 is rotating with main shaft E. Cam 22 bears against roller 34, pivoted between arms 23 of lever 24, and communicates upward motion to lever 24 and so to elevating-slide 21, on whose upper surface are the elevating-blades 31 31. When the box arrives at this upper level, it is received on hooks *a a* and arms *e e*, which are carried on slide 41, on which the box and cover are then sustained, the blades 31 31 on elevating-slide 21 then falling away. In this position the hook ends *m m* of the hooks *a a* engage with the forward side of box, so as to draw it back when hooks are retracted. The box is now held immediately under inclined planes M′ M² and in position to be filled with matches. While in this position, and before the retracting-slide is operated, the match-making machine is timed to eject from its endless belt *l* enough matches to fill the two boxes under the inclined planes, (which is what we call the first position,) that is, commonly about one hundred and eighty matches for each box. As the matches are expelled with some force from endless belt *l*, the guard-plate C⁴ (best shown in Fig. III) may be arranged immediately back of inclined planes to insure the deposition of the matches in the boxes. The boxes being filled, the retracting mechanism is timed to come into operation, and the boxes are retracted by hooks *a a*, which engage with front of box and cover. By this means they are retracted into second position, or position in which their front edges are engaged by hooks *b b*, so that at the next operation of the retracting mechanism the first box is retracted by hooks *b b* into third position under leveler 61. Simultaneously the second box is being retracted by hooks *a a* into second position, the following boxes are being carried in, elevated, and filled continuously and successively. It will be noticed that the operation of cam-slot 42 on lever 44 is timed to correspond with that of the longer cam 22 on lever 24, so that while the box is being held at the upper level on the blades 31 31 by operation of this longer cam 22 on lever 24, the preceding box has been retracted and the slide 41 returned to its normal or forward position, when it is in position to receive another box on hooks *a a* and arms *e e*. Next comes the operation of the leveling mechanism, which is so timed that by means of cam 62, lever 64, and pin 71 the leveler 61 will be raised so as to permit the boxes to be retracted freely and the first box, or the first pair, to be moved into position under it, when the roller 68 on lever 64 having been passed over the cam 62, the leveler settles back onto the boxes filled with matches, and for a short distance, say, about an inch, onto the inner end of each cover, holding the cover, and more particularly the box, filled with matches in position with some firmness, and also leveling and compressing the matches. The leveler 61 having settled down onto the boxes, the closing mechanism before described comes into operation. This closing is performed by a lateral end pressure of the slide 81 on the outer end of cover W′, so as to force the cover over the filled box, while the matches as well as box are held in position by the leveler. By this pressure of the leveler it happens that if some of the matches, as layer k^2 in Fig. XV, lie slightly above the box, the advancing cover will ride over them with a slightly rolling gentle pressure. The weight of the leveler is not great, but sufficient to compress matches and hold boxes and covers firmly without crushing while the covers are being forced on. There is no such force applied to matches as to run any risk of igniting them by friction against the leveler, the cover, or among the matches. All these steps of the process are performed during one rotation of main shaft, and on the next rotation of the shaft the same operation of elevating one box, retracting another by the first hooks, and retracting a third by the second hooks is performed, so that the box now resting under the leveler is forced rearward by these following boxes into what may be called the fourth position on the bed-plate between the leveler and the carrying-out belt 101, and by the next operation it is moved into the fifth position and onto the belt 101, by

which immediately and as fast as they are fed to it they are carried off to the side of the machine.

Having thus fully described our invention, what we claim, and desire to protect by Letters Patent, is—

1. In an automatically-operating match-boxing machine, the combination of a suitable supporting-frame, a suitable conveyer for carrying in the empty boxes and their covers, a cam-operated slide for elevating said boxes and covers to a position to receive the matches expelled from a match-making machine, a horizontal slide carrying hooks adapted to engage the boxes and retract the same when filled, a weight raised by cam action and dropping by gravity for compressing the matches in the box and holding said box and its cover in place, and cam-operated slides for closing the box, said slides operating at right angles to the direction of retraction.

2. In a match-boxing machine, mechanism for supporting and carrying in the empty boxes and their covers, said mechanism consisting of a solid roller and a shaft carrying a series of disks, endless belts running over said roller and disks, and means for rotating said roller and shaft, in combination with a vertically-reciprocating slide carrying lifting-blades adapted to move between the disks on the shaft and elevate the boxes and covers to the filling position, substantially as specified.

3. In a match-boxing machine, the combination, with the box and cover supporting and carrying-in mechanism consisting of a solid roller and a shaft carrying a series of disks, endless belts running over said roller and disks and means for rotating said roller and shaft, of a vertically-reciprocating slide carrying lifting-blades adapted to move between the disks on the shaft and elevate the boxes and covers to the filling position, and a horizontal slide provided with hooks adapted to engage and retract said boxes and covers, substantially as specified.

4. In a match-boxing machine, the combination, with a series of endless belts rotatably supported, of a vertically-reciprocating slide carrying lifting-blades adapted to move between the belts and elevate the boxes and covers, a horizontal slide provided with hooks adapted to engage the boxes and retract the same, and mechanism for leveling the matches, substantially as specified.

5. In a match-boxing machine, the combination, with a series of endless belts rotatably supported, of a vertically-reciprocating slide carrying lifting-blades adapted to move between said belts and elevate the boxes and covers, a horizontal slide provided with hooks adapted to engage the boxes and retract the same, mechanism for leveling the matches, and mechanism for closing the boxes, substantially as specified.

6. In a match-boxing machine, the combination, with a series of rotatable belts for carrying in the boxes and their covers, a vertically-reciprocating slide carrying lifting-blades a cam-operative lever for operating said slide to elevate said boxes and covers, of a horizontally-reciprocating slide carrying retracting-hooks, a cam-operated lever for operating said slide, a cam-operated gravity-weight for leveling the matches, and means for closing the boxes, substantially as specified.

7. In a machine for performing automatically the operations necessary for filling boxes with matches, the combination of the frame supporting the operative parts, a conveyer for carrying in the empty boxes and covers, a slide for elevating the boxes adjacent to guides down which matches expelled from match-making machine drop into boxes, a cam-operated slide carrying retracting-hooks for withdrawing the filled boxes, said boxes resting by their own weight on said conveyer, an elevating-slide and a retracting-slide.

8. In a machine for performing automatically the operations necessary for filling boxes with matches, the combination of the main frame, endless belts for carrying in the empty boxes and covers, cam-operated slides and carrying-blades for elevating the same, inclined planes for guiding matches expelled from the match-making machine into the boxes, cam-operated mechanism for retracting the boxes, gravity-weight for leveling the matches and holding the boxes in position, and cam-operated mechanism for simultaneously closing the boxes, substantially as described and shown.

9. In a machine for performing automatically the operations for filling boxes with matches, the combination of the main frame, endless belts for carrying in the empty boxes and covers, cam-operated slides for elevating the same, cam-operated slides carrying retracting-hooks for retracting the filled boxes, mechanism for leveling the matches and holding the boxes in position, and simultaneously-acting cam-operated slides for closing the boxes, substantially as described and shown.

10. In an automatic machine for filling boxes with matches, endless belts for carrying in the empty boxes and covers, cam-operated vertically-reciprocating slide for elevating the same, cam-operated longitudinally and horizontally reciprocating slide for retracting the boxes, cam-operated gravity-weight for leveling the matches in the boxes and holding the boxes in position, and cam-operated transversely horizontally reciprocating slides for closing the boxes, substantially as described and shown.

11. In an automatic machine for filling boxes with matches, endless belts for carrying in the empty boxes and covers, cam-operated vertically-reciprocating slide carrying vertical blades for elevating the same, cam-operated longitudinally horizontally recipro-

cating slide carrying a double set of retracting-hooks arranged in pairs for retracting the boxes, cam-operated gravity-weight for leveling the matches in the boxes and holding the boxes in position, and cam-operated transversely horizontally reciprocating slides for closing the boxes, substantially as described and shown.

12. In an automatic machine for filling boxes with matches, endless belts for carrying in the empty boxes and covers, cam-operated vertically-reciprocating slide carrying vertical blades for elevating the same, cam-operated longitudinally horizontally reciprocating slide carrying a double set of retracting-hooks arranged in pairs for retracting the boxes, cam-operated gravity-weight for leveling the matches in the boxes and holding the boxes in position, cam-operated transversely horizontally reciprocating slides for closing the boxes, and endless belt transversely operating for carrying away the filled and closed boxes, substantially as described and shown.

13. In a machine for performing automatically the operations necessary for filling boxes with matches, the combination of the frame supporting the operative parts, a conveyer for carrying in the empty boxes and covers, a slide for elevating the boxes adjacent to guides down which matches expelled from match-making machine drop into boxes, a cam-operated slide carrying retracting-hooks for withdrawing the filled boxes, said boxes resting by their own weight on said conveyer an elevating-slide a retracting-slide, a cam-elevated weight timed to be elevated to permit boxes to take position under it, and dropping by its own weight to compress matches and to hold box and cover in place, while a transverse cam-operated slide is forcing cover on filled box.

14. In an automatic match-boxing machine, the combination with a suitable conveyer for carrying in the empty boxes and their covers, a vertically-operating slide for elevating the boxes and covers, of a horizontally-reciprocating slide carrying one or more sets of pivoted hooks arranged to pass under a filled box and engage its forward edge when the slide is moved forward and to draw the box back when said slide is retracted, and a cam-operated lever for operating the slide.

15. In a machine for automatically filling boxes with matches, the combination of an elevating-slide supporting vertical lifting-blades and provided with side guides for guiding it in its reciprocating motion on the main frame, and a cam-operated lever for elevating said slide, in combination with retracting-hooks adapted to pass between the lifting-blades.

16. In a machine for automatically filling boxes with matches, means for elevating the boxes, consisting of a vertically-reciprocating slide formed to fit main frame and slide thereon, vertical lifting-blades arranged on said slide, a cam-operated lever bearing against the under side of said slide at one end, and supported on a shaft at its opposite end, and a cam keyed to main shaft for forcing said lever upwardly at each rotation, in combination with retracting-hooks adapted to pass between the lifting-blades.

17. In a machine for automatically filling boxes with matches, means for elevating the boxes, consisting of a slide formed with guideways at each end fitted to the main supporting-frame, and carrying vertical lifting-blades on its upper side and provided with a widened bearing face or faces below, a cam-operated lever having an antifriction roller or rollers at one end bearing against said widened bearing-face and supported at its opposite end freely on an axle, another antifriction-roller arranged between two arms of said lever, and a cam carried on a cam-wheel keyed to main shaft for bearing against said second antifriction-roller and forcing said lever up at each rotation, in combination a horizontally-reciprocating slide carrying retracting-hooks arranged to pass between the lifting-blades, substantially as described and shown.

18. In a machine for automatically filling boxes with matches, means for retracting the filled boxes, consisting of a suitable support, a horizontally-reciprocating slide supported thereon and arranged on the upper face of said slide two sets of retracting-hooks arranged in pairs, said pairs composed one of each set, and a cam-operated lever for reciprocating said slide, substantially as described and shown.

19. In a machine for automatically filling boxes with matches, means for retracting the filled boxes, consisting of a suitable support, a horizontally-reciprocating slide supported thereon, and arranged on the upper face of said slide two sets of retracting-hooks arranged in pairs, said pairs composed one of each set, and a cam-operated lever for reciprocating said slide, and a lever having two arms, a connecting-bar connecting upper arm of said lever to said slide and antifriction-roller arranged at end of lower arm, said antifriction-roller taking in a cam-slot on face of wheel keyed to main shaft.

20. In a machine for automatically filling boxes with matches, a retracting-slide fitted to slide on its supporting-frame, and arranged on its upper side sets of forward and rearward retracting-hooks, said hooks, one of each set, being arranged in pairs, each pair being pivoted between the two arms of a hook-support, one of said arms being provided with forwardly-extending portion, substantially as described and shown.

21. In a machine for automatically filling boxes with matches, a retracting-slide fitted to slide on its supporting-frame, and arranged on its upper side sets of forward and rearward retracting-hooks, said hooks, one of each set, being arranged in pairs, each pair being piv-

oted between the two arms of a hook-support, one of said arms being provided with forwardly-extending portion next to which the rearward hook is arranged, substantially as described and shown.

22. In a machine for automatically filling boxes with matches, retracting-slide 41, carrying hook-supports *c c*, provided with upwardly-extending arms *d* and *e*, and pivoted between said forwardly-extending arms hook *b* having rearward face *p*, and hook *a* having forwardly-extending hooked end *m* and rearwardly-extending portion, substantially as described and shown,

In witness whereof we have hereunto set our hands, in the presence of two attesting witnesses, at Oswego, in the county of Oswego, in the State of New York, this 22d day of July, 1895.

EDWARD M. LOCKWOOD.
WILLIAM M. PATTERSON.

Witnesses:
F. L. COOLEY,
JOHN TIERNAN.