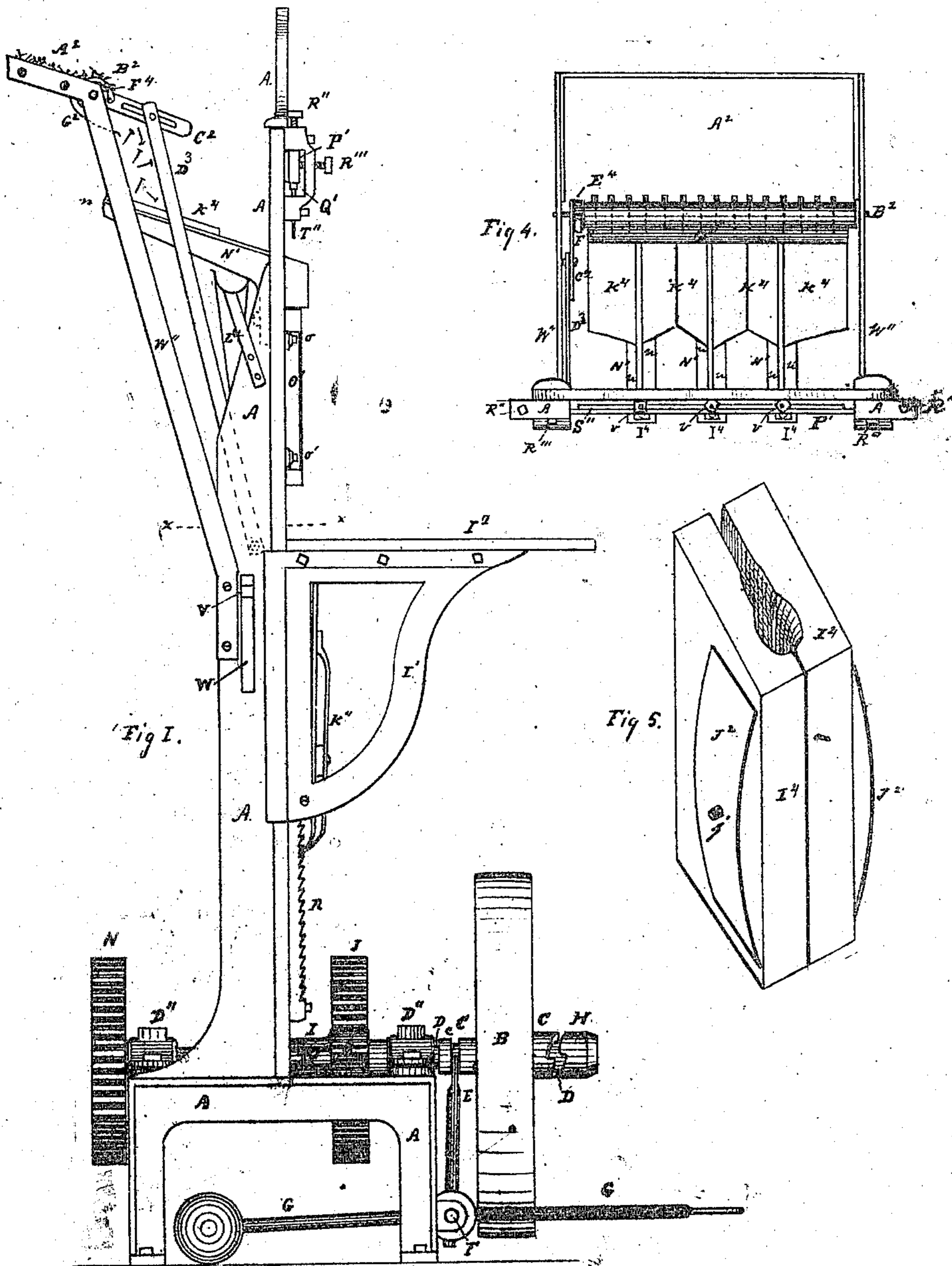


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Improvement in Machines for Nailing Boxes.

No. 128,698.

Patented July 9, 1872.



WITNESSES

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F. F. Warner.

INVENTOR.

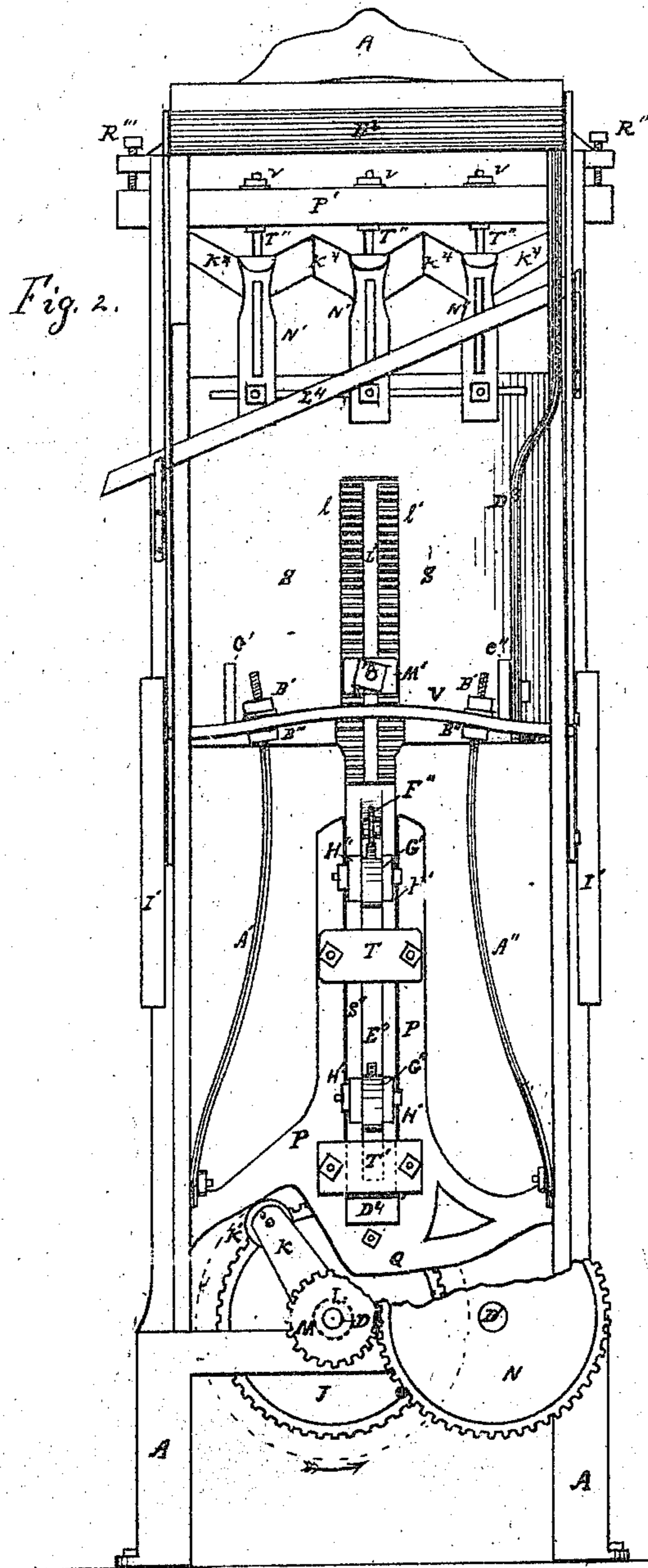
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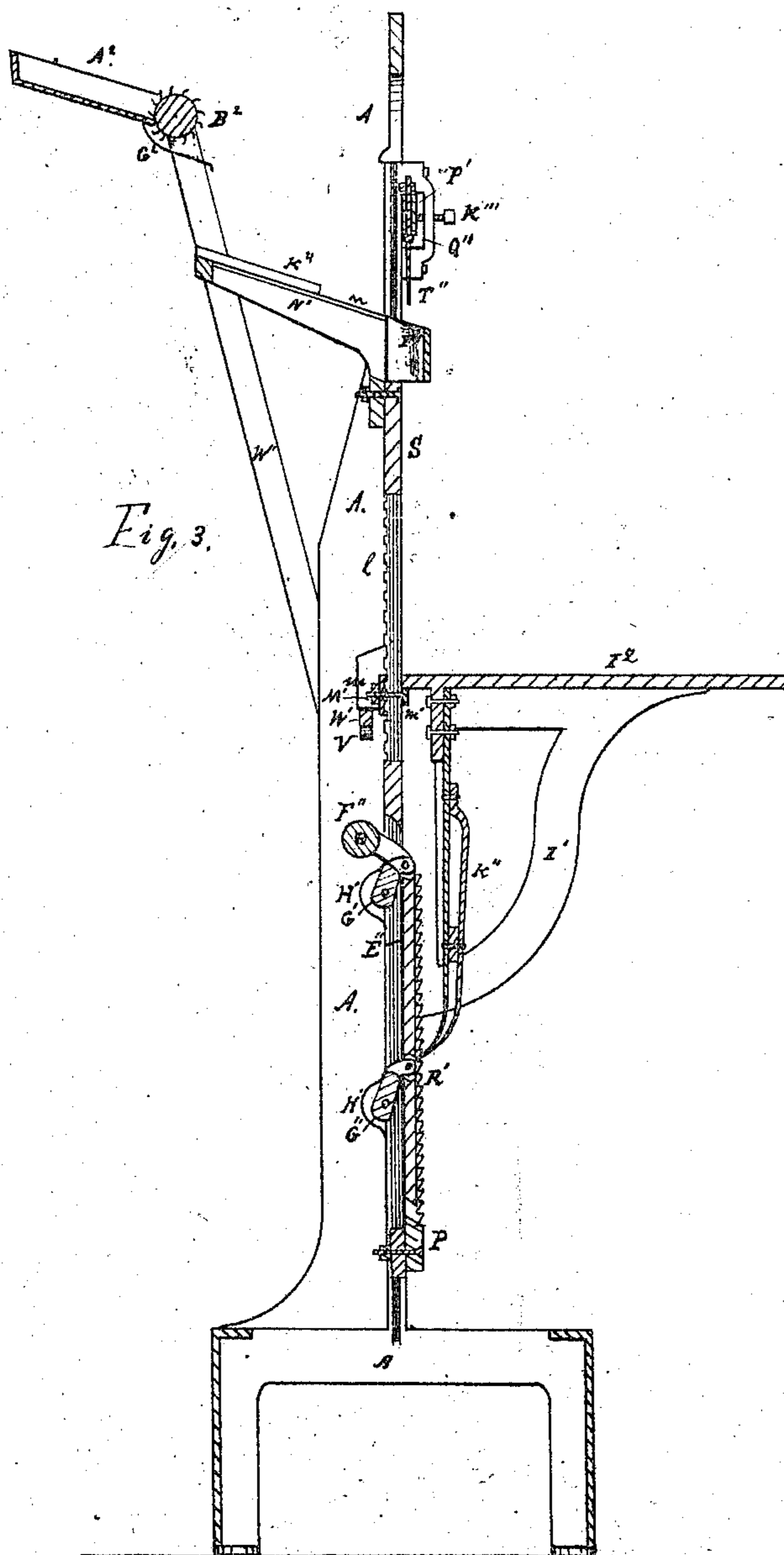
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UNITED STATES PATENT OFFICE.

EDWIN BEARD, OF OTTAWA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN H. FOSTER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN MACHINES FOR NAILING BOXES.

Specification forming part of Letters Patent No. 128,698, dated July 9, 1872.

SPECIFICATION.

To all whom it may concern:

Be it known that I, EDWIN BEARD, of Ottawa, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Box-Nailing Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawing forming a part thereof, and in which—

Figure 1 represents a side elevation of a box-nailing machine provided with my improvements; Fig. 2, a rear elevation of the same; Fig. 3, a vertical central sectional view of the same from front to rear; Fig. 4, a top or plan view of the same above the line *xx* of Fig. 1; and Fig. 5, an isometrical view of one of the dies or nail-holders detached, and of full size.

Like letters of reference indicate like parts.

My invention relates to that class of nailing-machines which have for their object the nailing together of boxes and it consists in providing means whereby boxes varying in size may be manufactured by nailing their parts together without a special adjustment of the machine for each size, and without a special adjustment during the operation of nailing the parts of each box together, the nails in either case being driven flush with the outer surface of the box, or the same distance below it; in other words, the adjustment for this purpose is automatic. It also consists of one or more adjustable and yielding dies or nail-holders, so constructed and arranged that they may be fed by a self-feeding attachment, and so that one or more nails will be presented to the wood with their broadest parts always in the same direction, and in such a manner that the punches will strike but one nail in each die at the same time. It also consists in providing a box-nailing machine with a novel self-feeding apparatus, whereby the nails are automatically taken from the nail-holding box and distributed to the dies, so as to be properly operated upon by the punches. It also consists in the general construction and arrangement of the various parts of the machine so that compactness is secured, and all the parts operate together in harmony for the purposes for which they are intended, all of

which will be hereafter fully described, the object of my invention being to facilitate the operation of nailing boxes together, and thus lessen the expense of their manufacture.

A is the frame of my improved machine. B is the driving-wheel, and C is a hub-projection, extending therefrom, and rigidly attached thereto. D is a shaft, having suitable bearings in the frame A, about which shaft the wheel B turns freely. *c* is an annular slot or groove around and near the inner end of the hub C, and E is a forked arm, the forked end of which rests freely in said slot. F is a rod extending across the frame A, and turning freely in suitable bearings therein. G is a treadle rigidly attached to the rod F, and having its rear end weighted. The forked arm E extends downward, and is rigidly attached to the rod F. The outer end of the hub C has ratchet-teeth or notches sunken into its edge. H is a band or clutch on the outer end of the shaft D and attached rigidly thereto, the inner edge of which clutch is notched to correspond to the notches of the hub-projection C. I is a sleeve about the shaft D, and J is a spur-wheel rigidly attached to said sleeve. K is a rigid arm projecting from the sleeve I, and K' is a friction-roller on the end of said arm. L is a collar on the shaft D to retain the sleeve I in place thereon, and M is a pinion on the end of said shaft. D' is also a shaft, extending across the frame A, and having suitable bearings thereon, as at D''. N is a spur-wheel on the rear end of the shaft D', and rigidly attached thereto, with which spur-wheel the pinion M engages. O is a pinion on the shaft D', and engaging with the spur-wheel J. P is a vertically-sliding frame, sliding in suitable ways on the frame A, and Q is a cam-projection on the frame P. R R' are ratchet-teeth on the front face of the vertical arms of the frame P, and extending laterally toward each other, so as to partially cover the space between the said arms, the inclined faces of said ratchets projecting upward and forward. S is also a vertically-sliding frame, sliding in suitable ways on the frame A, and S' is a vertically-slotted arm or projection extending downward from the frame S, and playing freely in the space between the vertical arms of the frame P behind the ratchet-teeth R R'. T T' are metallic plates connecting the rear faces

of the vertical arms of the frame P to strengthen them, and more effectually inclose the arm S'. V is a cross-bar, and W W' are vertical slots in the frame A, in which it rests. A' A'' are braces rigidly attached to the frame A, and passing freely through perforations in the bar V, the upper end of which braces are provided with a male screw-thread. B' B'' are nuts run upon the upper end of the braces A' A'', one above and one below the bar V, by means of which nuts the said bar is adjustable vertically. c' c'' are projections from the rear face of the frame S, which projections strike the bar V as the frame S moves downward, thereby stopping the further downward movement of the said frame, and the bar V is so adjusted that the downward movement of the frame S will cease before the bottom of the arm S' strikes the frame P, or so that there will be a space between the bottom of the arm S' and the frame P, as shown at D¹, when both the frames P and S are at the limit of their downward movement, the frame P being supported on the sleeve I before being raised by the arm k. E'' is a bar resting in the slot of the arm S' and moving freely therein. The upper end of the bar E'' is bent rearward, and F'' is a friction-roller therein. G' G'' are plates or toggle arms, the upward ends of which are bent forward and pivoted in slots in the bar E''. H' H'' are projections from the rear face of the arm S', between which the lower ends of the plates G' G'' are pivoted, so that the gravity of the bar E'' will tend to draw it forward and downward, so that it cannot move rearward sufficiently to reach a "dead center" over its pivotal connections. I' is a vertically-sliding bracket riding in suitable ways in the frame A and supporting the table or platen I''. K'' is a firm, strong spring, the upper end of which is securely attached to the table I'', and the free end of which rests in the ratchets R R'. L' is a vertical slot in the central part of the frame S, and the rear face of said frame, upon each side of said slot, is provided with a vertical ridge, and l' l' are square notches or grooves sunken across said ridges. M' is a metallic plate provided with a ridge corresponding to and resting in any of the notches l' l'. A bolt passes through the plate M', and the said plate is held in any desired position by means of the nut m on the ends of the said bolt, the head m' projecting forward sufficiently to arrest the downward movement of the table I''. N' N' are the die-holders, extending forward sufficiently from the upper portion of the frame S to come in contact with a box when placed on the table as the latter moves upward. O' is a small gauge. o o' are pins on which it is adjustable laterally by means of the slots and nuts, and the inner edge of the gauge O' projects forward sufficiently to come in contact with the side or edge of a box placed on the table so as to hold the box in a proper position thereon. P' is a punch-holding bar resting in the slots Q' Q'', in which it is adjustable vertical-

ly by means of the screws R'' R'''. S'' is a slot in the bar P', and T'' T'' are punches resting therein and in which they are adjustable laterally by means of the nuts v v. W'' W'' are braces rigidly attached to each side of the frame A and extending upward, and the upper ends of these braces may be extended rearward, as shown. A² is a nail-holding box between the braces W'' W'', the front end of the box being open. B² is a roller having spindles resting in any suitable bearings in the braces W'' W'', the roller inclosing, or nearly inclosing, the open end of the nail-box. The roller B² is provided with small fingers projecting therefrom, and at distances from each other about equal to, or a little less than, the size of the heads of the nails. C² is a slotted arm or lever through one end of which the spindle of the roller B² passes freely. D³ is a pitman, the lower end of which is pivoted to one of the projections c' c'', and through the upper end of which a wrist-pin passes freely into the slot of the arm c², which pin is capable of being tightened and adjusted in said slot. E⁴ is a ratchet on one end of the roller B², and F⁴ is a hooked dog or pawl which engages with the said ratchet, the lower end of said hook being attached to the arm or lever c². G² is a metallic apron attached to the box A² and extending beneath the roller B². The die holders N' N' are constructed with a longitudinal slot passing vertically through them, and on the upper face of the die-holders are plates n n, one on each side of said slot. These plates n n are provided with slots through which set-screws pass, so that the plates may be attached to the die-holders and adjusted thereon with relation to each other, according to the size of the nails. The die-holders are rigidly attached to the frame S. I⁴ I⁴ are nail-holders, made in two parts, as shown in Fig. 5, the inner face of each part being so formed that when the parts of the nail-holders are properly placed together there will be a vertical slot therein sufficiently deep to admit of the nails passing into the dies in a vertical position, and by a horizontally-sliding movement. The action of the punches in passing through the dies widens this slot sufficiently to admit the nails, and when the punches are withdrawn the action of the springs hereafter mentioned causes the dies to clasp the nails so that their movement ceases; this slot gradually widens so that but one nail at a time will be admitted to such widened part when the nails are released and be freely suspended therein by its head when the punches are withdrawn. The act of withdrawing the punches allows the nail so suspended to move to a position to be driven. The top of the widened part of this slot or groove has rounded edges, and these, together with the oblong form of the groove or slot, tend to turn the head of the nail always in the same direction. The forward ends of the die-holders are formed to receive the dies or nail-holders, and a die-holder is represented in Fig. 3 with one part

of a die therein, the die resting on the upper end of the frame S sufficiently to keep the die in place. $J^2 J^2$ are springs on the sides of the dies, and j is a pin on the sides of the springs, the pins resting in holes in the die-holders, the latter being constructed to receive both the dies and their springs. $K^4 K^4$ are metallic wings arched or inclined upward from the inner edges of the slot in the die-holders, or from the inner edges of the plates $n n$, as shown. L^4 is a trough beneath the die-holders, so arranged as to catch such nails as may not be conducted into the dies, and convey them into any proper receptacle.

The operation of my improved box-nailing machine is as follows: A driving-band is placed about the band-wheel, and connected with any suitable driving-power. The table is then adjusted according to the size of the box to be nailed by drawing it upward, and the spring K'' retains it in any desired position by resting in the ratchets $R R'$. The height of the table should be such that the space between the top of the parts to be first nailed and the dies or nail-holders will be somewhat more than the thickness of the boards of which the box is made. When the height of the table is determined the head m' should be adjusted in the notches $l l'$, so as to be in contact with the under side of the table. The bar V should be adjusted so that the space between the bottom of the arm s' and the frame P will also be somewhat greater than the thickness of the material of which the box is made. The punch-holding bar should then be adjusted so that the punches will be just above the dies or nail-holders. The foot of the operator is then placed on the treadle, and sufficient pressure exerted to raise its weighted end, thus throwing the upper end of the arm E forward, and pushing the clutches together. The shaft D then revolves, and motion is communicated to the wheel N by reason of its engagement with the pinion M, thus revolving the shaft D' ; and the pinion O communicates its motion to the wheel J, and causes the sleeve I and its arm K to revolve in the direction indicated by the arrow, shown in Fig. 2, and the arm K can revolve only in the direction indicated, for the reason that a contrary motion given to the driving-wheel will force the clutches apart, owing to the ratchet-shaped teeth with which they are provided. As the arm K moves in the direction of the cam Q, ample time is given to adjust the parts of the box upon the table, or to remove a box already nailed, and arrange the parts of another for nailing. As the arm K strikes the cam Q, the frame P, as well as the bracket I^1 and its table I^2 , are raised by reason of the spring K'' resting in the ratchets $R R'$. When the box reaches the dies or nail-holders, which will be before the frame P can strike the bottom of the arm S' , the box will carry up the frame S until the roller F'' strikes the bar V. As the roller F'' strikes the bar V, the bar E'' is forced forward, and the spring K'' is released from its ratchets. The table

now, having no support, falls upon the head m' , and the arm K travels a little further, and then releases the cam Q, when the frame P falls upon the sleeve I; and the frame S rests upon the bar V, the spring K'' having also fallen into its proper ratchet the instant the downward movement of the frame S released the roller F'' and bar E'' . The operation of nailing is thus continued until the box is nailed together, the nails being fed into the nail-holders in the following manner: The box A^2 is filled with nails of suitable size, and the inclination of the box throws the nails against the roller B^3 . As the frame S moves upward the pitman D^3 throws up the forward end of the lever C^2 , so that the hook F^4 passes over the ratchet-teeth E^4 . As the frame S descends the hook F^4 engages the ratchet-teeth E^4 and turns the roller B^2 forward. The fingers on the roller B^2 pick up the nails, and throw them on the wings $K^4 K^4$. Such nails as may fall between the nail-box and roller are caught by the wing G^2 , and pass upon the wings $K^4 K^4$. The nails after falling on the wings $K^2 K^2$ slide down and are caught by their heads between the plates on their die-holders $N' N'$, and sliding along between said plates are delivered into the dies or nail-holders. The nails not thus caught between the plates $n n$ drop into the trough L^4 . As the punches pass into the dies or nail-holders the latter are pressed slightly apart, so that the forward nail in the narrowest space between the parts of the nail-holders slides into the next broadest space, which is sufficiently broad to admit of the nail being freely suspended therein by its head. After the punches move upward out of the dies or nail-holders the forward nail drops into the broadest space between the parts of the dies, so as to be struck by the next downward movement of the punches; and the action of the springs $J^2 J^2$, by pressing the parts of the dies against the nails in the narrowest space as the punches ascend, prevents the nails from being delivered to the latter until the proper time. The inclination of the nail-box, and die-holders, and dies, together with the jarring movement of the machine while being operated, produces the downward and forward movement of the nails above described.

It will be observed, from the foregoing description of the operation of my invention, that, after the various parts of the machine are once adjusted, a side may be nailed upon the ends of a box, and that room will remain between the parts so nailed and the nail-holders or dies for the insertion of the other side upon the ends, so as to be nailed thereto without a further special adjustment for that purpose, and that the nails will be driven the same distance into the wood in each case. In like manner, boxes varying in size, or boxes of varied proportions, may be nailed together without a special adjustment after an adjustment is once made for each size and proportion, and the thickness of the material. When a special adjustment is required, an adjust-

ment of the table only will be required in most cases. In constructing the machines and making provision for automatic adjustment, regard should be had to the thickness of the material to be used in the construction of the boxes, and for the varying proportions of boxes of the same size, if desirable, and the table should be capable of an adjustment corresponding to the different sizes of boxes to be nailed on the same machine. The scope of the automatic adjustment may be increased by varying the proportions of those parts of the machine on which it depends, so that boxes varying considerably in size may be nailed on the same machine without a special adjustment, the table being first adjusted to the largest size. It will also be observed that the arm K is nearly or quite in a vertical position while the nails are being driven, so that the greatest force is then exerted. The arrangement of the wheel J on a sleeve, as described, admits of the power being multiplied, while compactness in the arrangement of the gearing is also secured.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination, a table or box support, I², stop or release device E'' K'', nail-holders or dies P, punches T'', and movable frames or

gates P and S, arranged to nail together the different parts of a box, and of boxes of various dimensions, without special adjustment for that purpose, substantially as set forth.

2. The yielding and slotted dies or nail-holders P, the slot terminating in a groove, and the upper opening of the slot and groove gradually widening toward the closed end of the dies, for the purpose of receiving the nails from a self-feeding mechanism, and conducting them one by one beneath the punches in a position to be driven, substantially as described.

3. The die-holders N' N' provided with wings L' and longitudinal grooves, for the purpose of receiving the nails promiscuously from a self-feeding attachment, and conducting them to the dies or nail-holders in a position to be driven, substantially as specified.

4. The self-feeding attachment to a box-nailing machine, herein described, whereby the nails are picked promiscuously from a nail-box, A², by an intermittently-rotated fingered roller, B², and delivered to the machine, substantially as specified.

EDWIN BEARD.

Witnesses:

N. C. GRIDLEY,
F. H. BROWN.