

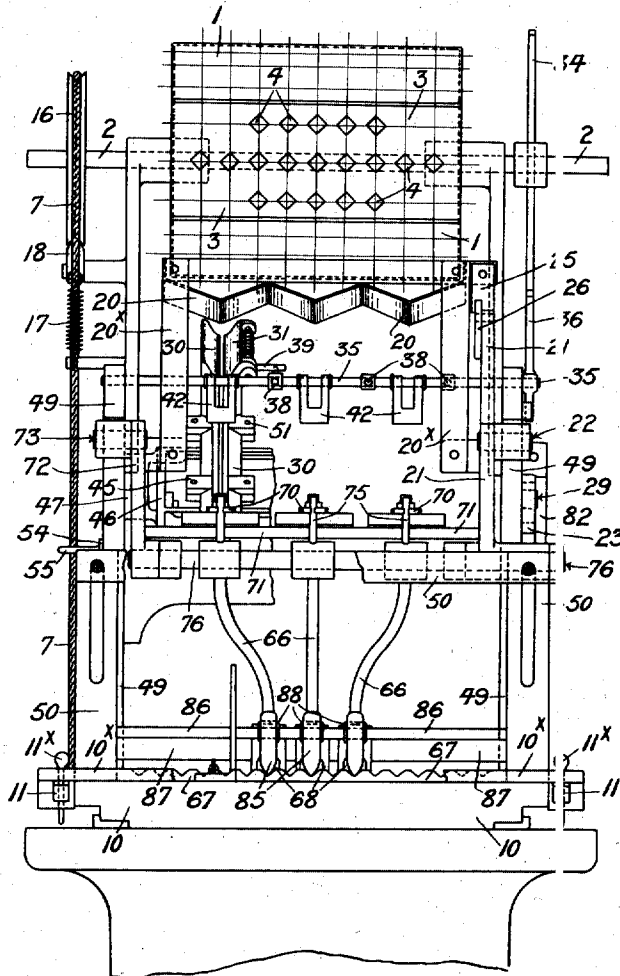
D. J. G. MILLER.
 NAILING AND SIMILAR FASTENING MACHINE.
 APPLICATION FILED JUNE 30, 1911.

1,008,608.

Patented Nov. 14, 1911.

4 SHEETS—SHEET 1.

FIG. 1.



INVENTOR:

WITNESSES:

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Donald John Gunn Miller
 BY *(Signature)*
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4 SHEETS-SHEET 2.

FIG. 2.

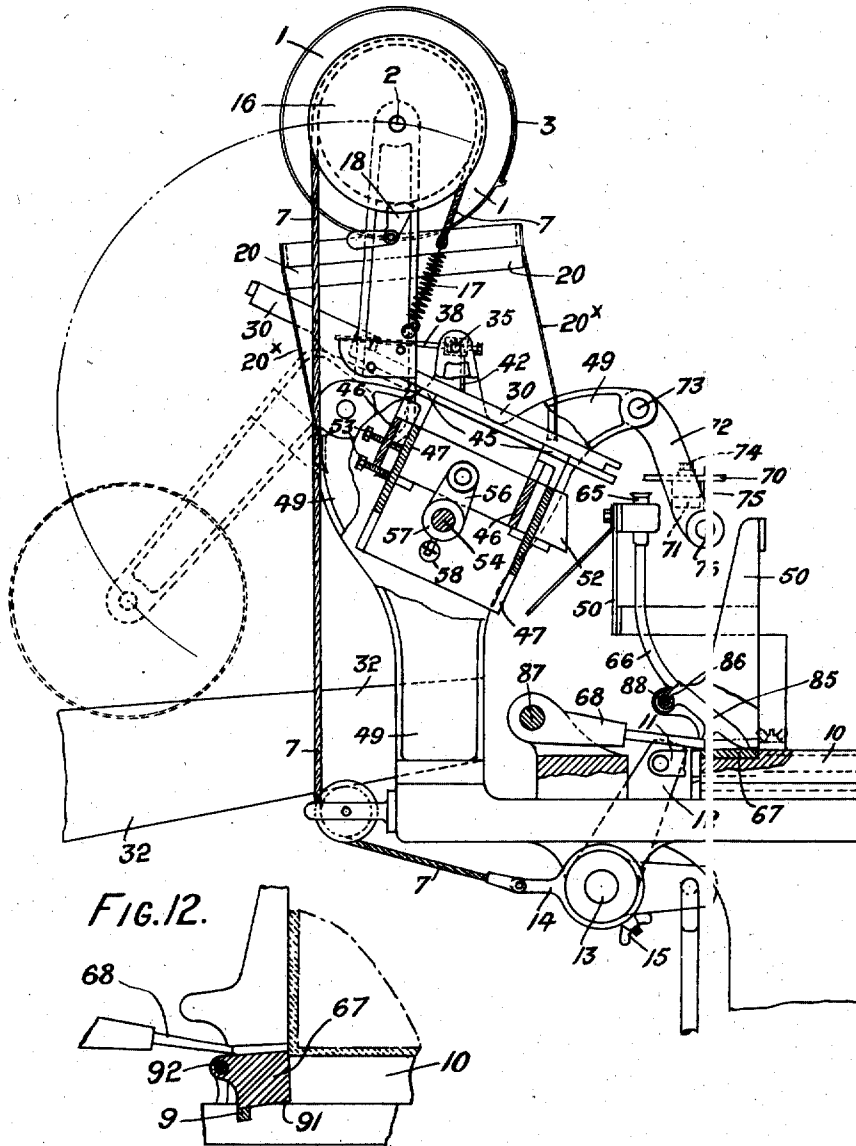


FIG. 12.

WITNESSES:

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INVENTOR:

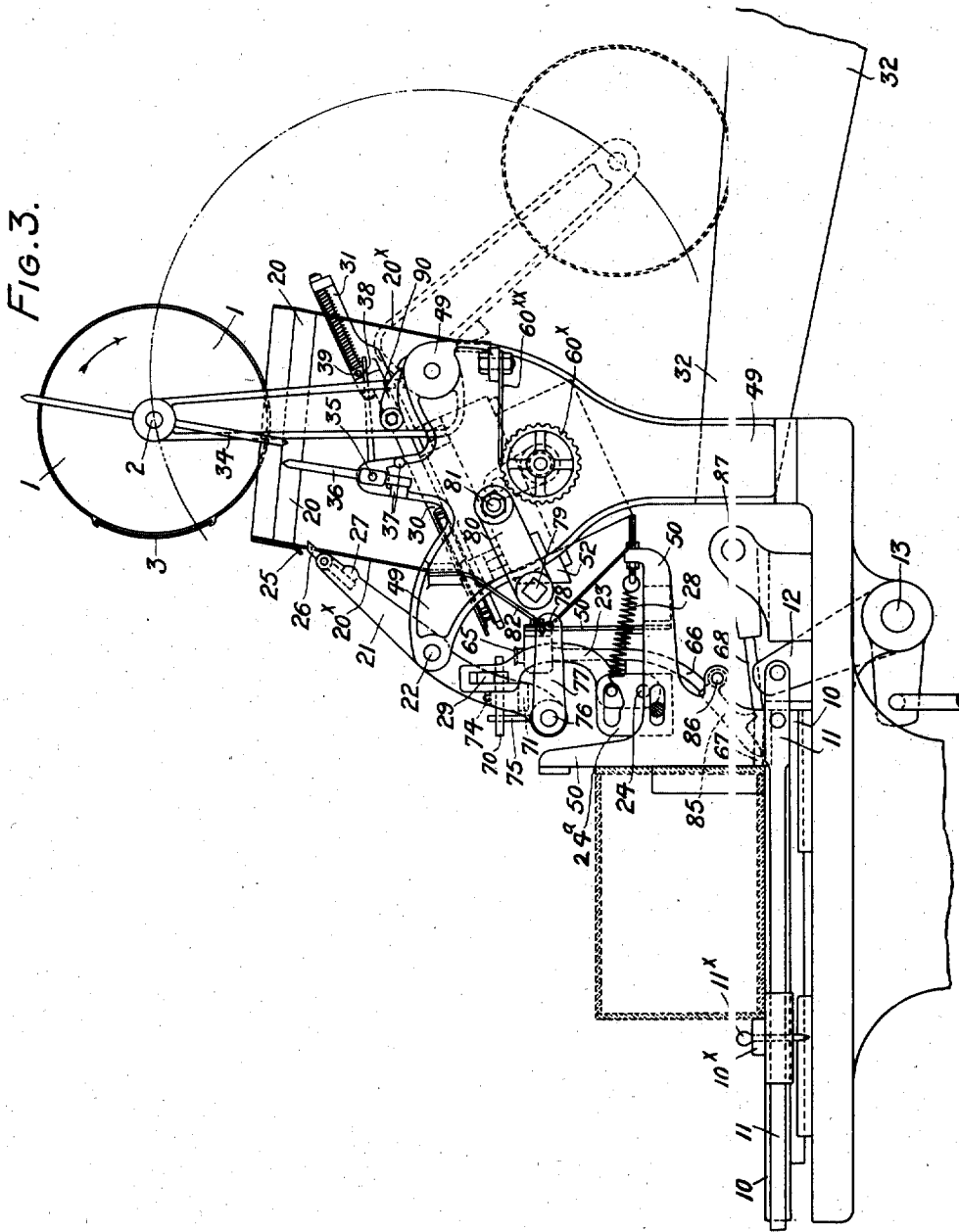
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4 SHEETS—SHEET 3.



WITNESSES:

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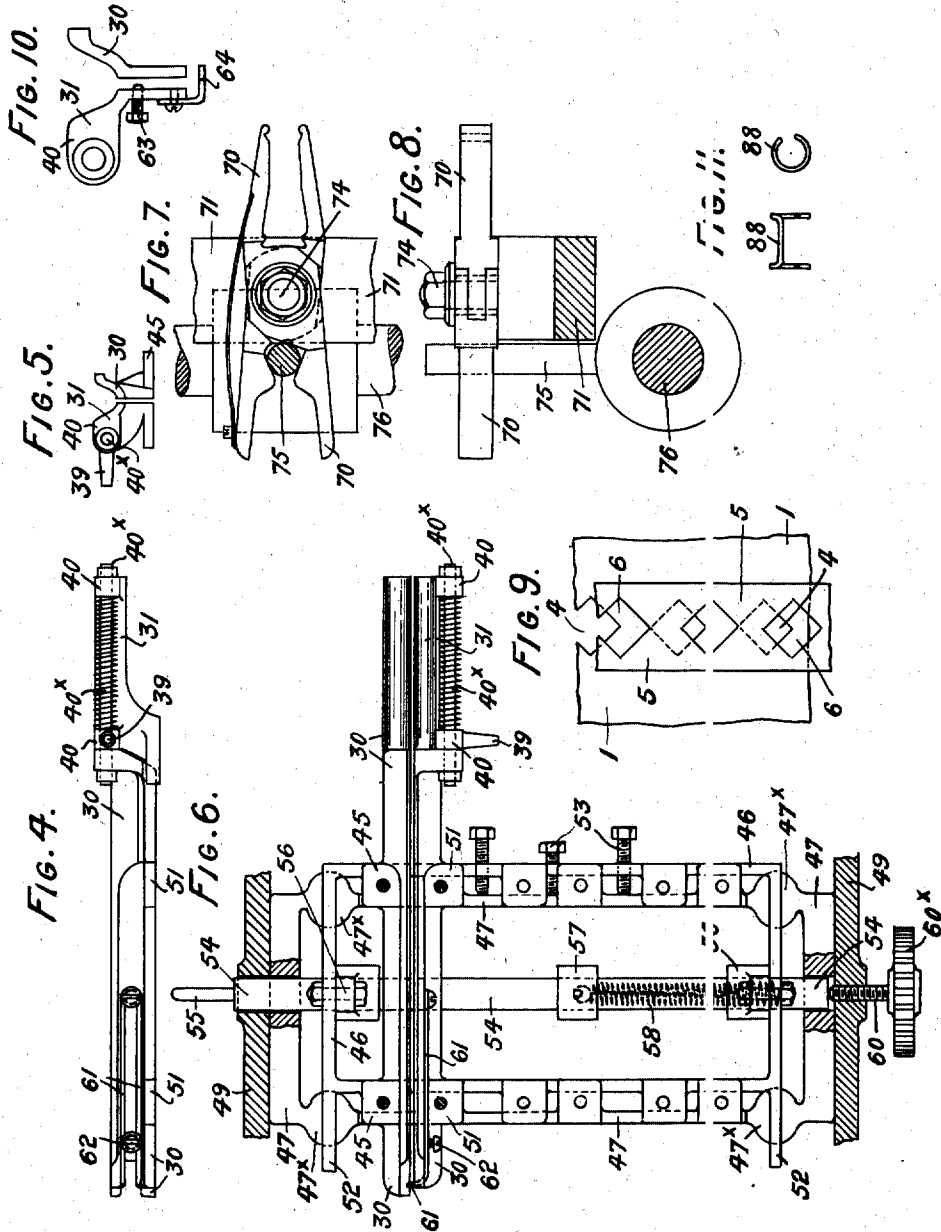
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

DONALD JOHN GUNN MILLER, OF BOOTLE, ENGLAND.

NAILING AND SIMILAR FASTENING MACHINE.

1,008,608.

Specification of Letters Patent.

Patented Nov. 14, 1911.

Application filed June 30, 1911. Serial No. 636,194

To all whom it may concern:

Be it known that I, DONALD JOHN GUNN MILLER, a subject of the King of England, residing at Bootle, in the county of Lancaster, England, have invented certain new and useful Improvements in and Relating to Nailing and Similar Fastening Machines, of which the following is a specification.

This invention has reference to nailing and similar fastening machines of the type in which the nails or fasteners are contained in a vessel, and are fed to a longitudinally slotted or divided nail chute, whence they pass *seriatim* to the nail tubes, being controlled by means disposed at the upper ends of the tubes by which the nails are carried to the grooved hammer plate, whereby they are supported in front of the hammers which serve to drive them into a box or article on a movable table.

The invention has primarily for its object and effects to provide improvements hereinafter described in connection with machines of the kind referred to, by which they are rendered more certain in action, quicker and also generally more efficient and convenient for the purposes for which it is used.

The invention comprises the novel features of construction and arrangement and combination of parts hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings illustrating the invention Figure 1 is a front end elevation of the machine; Fig. 2 is a side elevation showing the machine partly in section; and Fig. 3 is a side elevation of the machine looking on the opposite side to that given in Fig. 2. Fig. 4 is a detail side view of one of the chutes. Fig. 5 is a view of the upper end; Fig. 6 is a detail sectional plan showing the means for operating the movable sides of the chutes. Fig. 7 is a plan view of one of the pairs of tongs. Fig. 8 is a side elevation thereof. Fig. 9 is a detail view illustrating the manner of varying the size of the hopper openings. Fig. 10 is a detail view showing certain modified chute arrangements, and Fig. 11 is a detail view of the spring hooks 88. Fig. 12 is a detail view of the nail driving and guiding means.

Referring now to the drawings, the container for nails is designated 1; it being mounted in bearings 2 at each end, carried

on pivots from the main frame of the machine. The container is of rotary type, and is preferably cylindrical in form, as shown in the drawings—but it may if desired be polygonal—and it has a sliding or hinged door 3 on it, through which the nails are introduced into it, in bulk. The nails are discharged or delivered from the container through apertures 4, set in rows or rings around it, the number of which will be arranged to suit the maximum number of rows of nails to be introduced into the parts of the box or other article to be joined together; and in one and an advantageous construction, these holes are adapted to be made larger or smaller at will, so as to enable the delivery of smaller or larger nails or heads of nails, to be made, with equal certainty. In the machine shown in the drawings, this is accomplished by using revolving or sliding rings or sleeves 5 which are shown in detail in Fig. 9 in connection with the container 1. Preferably, the holes 4 are of diamond shape, as shown, and the holes 6 in the slide rings are of the same shape; so that, when these two holes coincide, the full area and size of the hole is available, for allowing nails having the largest size of heads to be delivered; while when it is moved from this position then the available hole area will be less, but the holes will still retain the diamond or square shape, no matter to what position the rings are moved, and this is desirable, as in case of using nails with irregular shaped or non-circular heads they will always drop through without regard to the position of the head with relation to the hole. The degree of opening will of course, be according to the size of the nail being used. Preferably the cylinder or drum 1 will be given a fraction of a revolution for each action; but it may if desired, be made to revolve continuously, this depending upon the purpose to which it is put, and special requirements of any particular case. In case of the container having a fractional movement of rotation for each operation, it may be obtained from a part of the machine through a flexible band or the like. This is illustrated in Figs. 1 and 2. In this drawing 7 represents the flexible cord or band, which is operated from the shaft 13, by an arm 14 mounted on the treadle actuated shaft 13 (the arm itself being adjustable on the shaft circumferentially by a clamping nut

device 15, to give different degrees of movement to the container 1); and the band or cord 7 passes over a pulley 16 fixed on the drum spindle 2, and is fastened at its other end to a spring 17, which itself is secured to a fixed part of the frame. This shaft 13 is connected to the box moving transverse bar 10*, of the table 10, by arms 12, and side rods 11, which are connected to the bar 10* by pins 11* in the usual way. Thus when the table 10 is moved rearwardly, the cord or band 7, by the means described, will be pulled down, and the pulley 16, and with it the drum 1, are moved a partial revolution; while, when the table and bar are moved forwardly after the nailing operation, the band 7 will be slackened by this action, and the spring 17 will pull it over, causing it to slip on the periphery of the pulley 16, which in this action is prevented from rotating by a brake cam 18, so supported and hinged, as shown, that while it permits the pulley to revolve freely in one direction, namely, in a positive action, in the return action it grips or brakes and holds the pulley 16. Thus the pulley 16 is turned around, frictionally, by the band 7 and the brake cam 18.

The nails are delivered from the container or drum 1 on to a vibratory device 20, which may be in the form of a tray, supported by upright members 20* of spring form, carried from the frames, so that when the tray 20 is moved and released, it will be vibrated by and upon the arms 20*. The tray 20 has a general incline in the direction of the feed of the nails, namely, from the front to the back, and below it are the guides or ways for the nails to travel down; and they are delivered from the vibrating device on to the said guides. The vibratory tray device 20 is of a ridged and grooved section, so that the nails as they fall into it, are acted upon in such a way as to cause them, when they reach it, to take a longitudinal direction, and to fall endwise in the required direction into the nail chutes or slides below. Beyond this object and effect, it has the effect of also equalizing the movement of the nails to the chutes or slides and generally controlling their movement; and it causes them to be delivered at a uniform rate, and in a manner that they will be well distributed. This vibratory effect upon the tray 20 may be effected by any suitable means. In the case shown, this means is a trip motion, and it consists of a lever 21 at one side, hinged at 22 to the side frame of the machine, such lever being rocked about the hinge 22 by an arm 23, supported by a pivot 24, in a bracket 24* carried by the movable front gage frame 50 of the machine, which the vertical part of the box or the like rests against in the nailing action; the arm 23 being connected by a pin joint

29 to the lever 21, and normally pressed and kept in the position shown by a spring 28; which only comes into action when the upper end of the lever 21 acts on a tripping projection or part 25 on the tray 20, this end having a pivoted pawl 26 upon it, and the inner end of which works against a stop 27 in one direction only. Thus when the frame 50 is moved backwardly, the arm 23 moves the lever 21 in one direction, so as to bring the catch 26 outside the part 25; while when the front frame 50 moves toward the front of the machine, the lever 21 is rocked in the reverse direction by the arm 23, and its catch engages the tray projection 25, and presses the tray back, and then leaves it, and passes to the opposite side of it; and upon the tray being so released, the spring supports 20* cause it to vibrate several times, and so the nails are marshaled in it, and move down it to the discharge edge.

The chutes or slides 30—shown in detail in Figs. 4 and 6—down which the nails pass to the "hammer" tubes, have at their upper or first part, a portion 31, which is adapted to move, so as to open, so that any nails that may have become caught in the chutes or slides, and clog it, are released, and will fall into a suitable catch tray 32 below, after which, upon closure, the chutes or slides continue to act normally. This opening or movement takes place about an axis parallel with the direction of length of the guides, so that one-half of the guides, which is on one side of the guide groove or way through which the shanks of the nails hang and slide, will move away from the other when opened. In the case of this part 31 of the guides or slides 30 being automatically operated and opened as described, it is conveniently done by projections 34 on the spindle of the drum 1, which operate in connection with a transverse rocking spindle 35, carried in the main side frames of the machine, and having an arm 36 on it (the short end of which operates between two stops 37); while the shaft 35 has also on it, within the side frames, a number of arms 38 at required points, the outer ends of which operate in connection with pins 39 fixed on one of the hinge lugs 40 of the movable side parts 31, which are carried from the stationary parts of the slides 30, by pivot rods 40*; and thus, when the arm 36 is actuated and the shaft 35 rocked, the opening side parts 31 of the guides 30, are swung about their hinges, and the nails which they hold, are dropped into the pan 32 below. The frequency of the actuation of these movable parts 31 of the chute or guide may vary, and will be determined by the requirements in each case. Further, in connection with each of the chutes or slides 30, there is a depending or movable device 42, preferably pivotally mounted on the rod 35, and

such device acts in the nature of an obstruction in connection with the chutes or slides, and rests upon their upper edge; the object and effect of which is to control or retard the downward movement of the nails along the chutes or slides, and prevent spurting of the nails down to the machine table at an inconvenient or undesired rate, such as might happen by the nails sliding down on the tops or heads of the other nails, which are within the chutes or slides in their proper position, or those which might leave the V shape portion of the chutes—which is the upper portion referred to—with sufficient impetus to carry them farther than convenient. This device 42 acts generally as a brake or controller to the feed of the nails.

With reference to the portions of the chutes or slides 30 which are below the upper part, one half of these, that is the half on the opposite side to that having a movable part 31, is movable longitudinally, and is so moved at each action of the machine; and also in some cases it is movable laterally or bodily in relation to the other part, which is fixed or stationary. For instance, this one half may be automatically moved longitudinally more or less continuously, so that while retaining the width of the aperture or way between it and the stationary part, through which the shanks of the nails lie, it, as it were, agitates or moves the nails, and insures their traveling down the slides; and in case of any of them becoming jammed, and requiring relief, by moving this side or rail bodily, laterally, say by hand, in relation to the other, the whole guide is opened out, so that the space between the two is wider than the heads of the nails, and all the nails in the guides drop out of them, and so they are cleared. Preferably all the movable parts of the slides or guides are connected together, so that by one movement they are all operated. This latter movement may be effected conveniently by hand; and the movable sides of the guides or slides are moved in the opposite direction to that just referred to, and kept normally in position in relation to the fixed part in the lateral direction by a spring; which also serves as a relief means, in the case of the guide or slide being jammed by bent nails or other obstructive things; and so the slides or guides are prevented from becoming bent or cut by such jamming or the like. Further, as regards the effect of the longitudinal movement of the movable parts or sides of the chutes or slides 30, as described, this movement helps the nails down them, and also turns the rough parts into the best position for sliding.

In the machine shown in the drawing, the double movement of the movable bars or

sides of the guides or slides 30 is provided for and these features and construction of the machine shown will now be described.

The movable part of the guides or slides 30, as stated, are those on the side opposite the movable parts 31; and they are provided with lugs 45, which rest on, and are fixed to, similarly formed lugs on the upper edge of a movable box-like casing 46, which is mounted on and works on a stationary box-like casing 47, fixed in and carried by the side frames 49 of the machine; and the lower edges of the ends of the movable casing 46 rest upon flanges or surfaces 47* of the stationary box frame 47. Thus, whatever movement is imparted to the box casing 46, will be imparted to all the movable sides of the slides or guides. The opposite or stationary side of the slides or guides 30 is provided with lugs 51, which are similar to the lugs 45 and they are fixed to corresponding lugs formed or provided on the transverse sides of the stationary box-casing 47.

It will be noted that the box-casings 46, 47 are so arranged, that one transverse side of the one, comes within the transverse sides of the other, as is seen in Fig. 2; the two boxes being so formed and cut away at different parts, to enable this to be done. The normal to and fro motion of the box 46, and the moving parts of the slides 30 which it carries, is effected in each action of the machine by a part of the movable front frame 50 coming in contact with the edge 52 of the ends of the box frames 46, when it is moved longitudinally in the nailing action; and the limitations of movements longitudinally of the box 46, are effected by the set screws 53, which screw into the sides of the box-casings 46, 47 respectively, as shown in Figs. 2 and 6.

The return action of the box frame 46 may be effected by a spring, as stated. The bodily lateral movement of the frame 46 is effected by a rod 54 which lies below the movable case 46, and projects through the end of the stationary case or box, and the side frames 49; and has upon it two arms 56, which project up and are fixed to the ends of the movable box frame 46; and by a collar 57 on the rod 54, and a spring 58 connecting this collar to a stationary part, the movable frame 46 and the movable guide sides, will be normally pulled and kept in the closed position while to open the slides or guides, a handle 55 on the rod 54 is pulled out, whereby the movable sides of the guides are moved bodily away from the fixed sides, and the guides or slides are thereby completely emptied of nails, which fall through the spaces between them, into trays or receptacles below.

The degree of the opening of the slides or guides, that is the distance they are apart,

is governed by a screw stud 60, screwing into the opposite side frame 49 to that on which the handle 55 is located; and the end of the rod 54 engages with the end of this stud; and so by screwing the stud, the rod and the movable slides or guide members, will be moved and adjusted as required. This adjustment of the two sides of the guides or slides will vary according to the size of the nail. The stud 60 is capable of free adjustment by having upon its outer end a notched large setting wheel or head 60^x; and it is held after adjustment, by a spring catch 60^{xx}.

In connection with each of the chutes or slides, a spring 61 is provided on the side of the fixed portion, this spring having in the case shown, upper and lower members, the ends of which are bent around nearly at right angles, and the extremities of which will normally bear upon the inner face of the movable side of the guides or slides 30. The members of the spring stand apart as shown in the drawings; and thus the two ends stand normally in the path of the nails; and upon the nails being removed, as hereinafter described, the spring ends are pressed back, and then fly to again. The two ends of the spring can act independently of one another, and if a nail be too short, and is not held by the lower spring, this lower spring would not be opened, when the short nail is removed, and so the nails behind, could not come out of their order and position for proper removal. The movement of the springs outward is limited by a screw 62, or other device. The spring method of holding the nails, whether the spring be of double or single form, permits of nails whether bent up into horse-shoe shape or other form, or flattened nails, or adhering nails, being removed with certainty by the removing means.

In some cases, a pin or screw as 63, is introduced through the side of the upper part of the guides or slides 30—viz. that opposite the part 31—so that in case of a nail with a relatively large shank being delivered to the upper part of the guides, it would be stopped and held, until the slide part 31 is automatically opened, as above described. The same applies to bent nails. Furthermore, in case of any extra long nails, longer than those being used passing down the chute, these can be stopped by providing a cleat or angle device as 64, on the upper part of the guide, and adjustable vertically, to suit different lengths of nails. When any long nails come down, their ends would be caught by the device 64, and prevented from being fed to the machine; and they would be retained until the part 31 is worked as just described, automatically. This device or means 64 may be magnetic, so as to hold more or less, onto the nails as they move down, and retard them so much

that they would remain in the upper part of the guide, until the part 31 is opened.

It will be understood, that in connection with the different parts where nails are to be released, there will be provided suitable trays and chutes for receiving and carrying off the nails released. The nails are removed from the lower ends of the guides or slides 30 by a device of a tongs or nippers character—one of which is shown in Fig. 7—by which they can be nipped and grasped, withdrawn from the slides or chutes past the springs 61, and then released.

The removing tongs or devices are carried in such a manner as to be moved up to the nails in the ends of the chutes, and then they are adapted to grip the nail in each chute and draw it away; and then, when they have receded, to drop them into the bell mouths 65 of the tubes 66 for conducting them to the horizontal notched plate 67 in front of the hammers 68; and this motion or movement of the tongs may be through a radial, or rectilinear, or angular path.

In the case shown in the drawings, the tongs devices are designated 70, and are mounted in a horizontal plane, and carried on a bar 71 extending between the arm 72 on one side of the machine, and the lower part or arm of the lever 21 on the other side of the machine; these parts being supported by the pivot joints 73 and 22, respectively. Each tongs device 70 is supported by a pivot 74 at or near the center; and in the case shown, the tips of the jaws which engage the nails in the ends of the slides, are gapped as shown; while the opposite ends of the inside edges are inclined internally as shown, and in connection with these ends, pins 75 carried on a rod 76, supported loosely in the lower ends of the arms 72 and 21 work. Namely, the pins 75 move into engagement with and open and keep open the tongs; and then move away from them out of engagement, whereupon the tongs close by means of a spring.

The rotary movement of the rod 76 is effected by a lever 77 which is fixed on the outer end of the shaft 76, and has a stop or rest device which serves to support it in a definite position relatively to the arm 21, and such lever 77 has a pin 78 on it, which in the forward movement, in which the nails are to be engaged by the tongs, comes in contact with a diamond shape projection 79 carried on an arm 80 hinged at 81, and first lifts this end of the arm; and then passes it, the projection 79, whereupon the arm can drop again on to its rest or support, such as the pins 75 which rest against the rear end of the tongs 70; and then on the return of the arm 77, which has been rocked upwardly—owing to its being supported and moved inwardly by the inward movement

of the box table—the pin 78 will strike the rear upper angular side of the projection 79, and it will ride over it, and thereby lift the arm 77, and so oscillate the shaft 76. And when the return of the arm 77 is nearly made, the pin 78 will strike the inclined spring arm 82, and this arm will force the pin 78 and arm 77 down, and so bring the parts to their normal position. In this position, the pins 75 on the shaft 76 will be in the recess within the back inclined ends of the tongs 70; and as shown in Fig. 7, in this position the tongs are open at their ends; and this position will be maintained until the pin 78 of the arm 77 is operated by the projection 79 in the manner just described, which turns the shaft 76, and moves the pin 75 out of the tongs; and when this happens, the jaws of the tongs will be one on either side of the nail in the guide or slides. Thus when this releasing action of the tongs takes place, and the tongs close, they will take hold of the end nail, and they will hold it until the arms 21 and 72 have been moved (which movement has already been described), and are nearing the forward or outer end of their stroke; whereupon the arm 77 is pressed again, and the pins 75 on the shaft 76 move and open the tongs again, and so drop the nails held by them into the nail tube feed mouths 65. This completes the operation.

The nail hoods 85, and the hammers 68, which work in connection with them, are supported by and adapted to be adjusted on rods 86 and 87 respectively; and the hoods have in connection with them spring hooks 88 shown in Figs. 2 and 17 which come on each side of the portion of the hoods which fit and slide on the rod 86; and they grasp the transverse rod 86; and thus the tension of this grip of the rod on each side of the hood constitutes a fastening, so that the hoods will be held firmly over the groove of the toothed plate 67 on which the hammers slide. At the same time, the spring fasteners are such, that the nail hoods 85 (Fig. 2) can be easily moved to any position laterally of the machine, as may be required; that is, according to the points at which the box or article is to be nailed or fastened.

The toothed or ridged plate 67 on which the nails lie prior to being moved, is in some cases made to tilt as the nails are driven in, so that the nail will be held in a constant direction, and parallel with the pieces of wood or material into which it is to be driven, and thus there is no tendency for the nail to be driven or run obliquely, and come out of the surface of the wood or material in which it is being driven, either on one side or the other. This tilting of the incline of the toothed or ridged plates 67 in the manner desired, can be effected in any

suitable way from a moving part of the machine.

When the nail is just being entered into the wood by the rearward movement of the table with the wood on it, the front end of the grooved plate will be in the position shown in Fig. 12 of the drawings, and it will rest or be held in this position on a stationary bar or support 9, underneath it; if now the table and grooved plate 67 are moved rearward toward the hammers in the nailing action, the forward edge of the plate 67 will gradually fall, owing to the inclined surface 91 underneath the plate, and as the nail head comes nearer to the front edge of the table, the bottom of the groove on which it rests will be continually lowering, and the tendency of the nail being forced obliquely, so that the point comes out of the wood, is obviated. The grooved plate 67, is pivoted at 92 to the table 10 or moving part connected therewith, and the support 9 is attached to the frame of the machine.

To adjust the arm 80, and the projection 79, for the purpose of timing the actions of the parts above described, the arm 80 may be mounted on an eccentric bush or upon a pin 81.

The nail container 1 is adapted to be moved from its normal upper position in which it is worked, to a position on a lower level, so that it is rendered more convenient for filling or charging with nails or emptying; and in the arrangement shown, this is accomplished by mounting the arms on which it is carried from the main frame of the machine on pivots, so that by swinging the arms down about the pivots as shown in dotted lines, the container will swing downward; and it is held in its normal position by a pawl 90 or the like which engages with a toothed projection on the frame when in this position. Further, in some cases, the back edge of the receiving spouts or funnels 65 of the tube 66, could be slotted, so that in case long nails are being delivered their lower parts would pass through these slots or gaps, before they were released by the tongs, with the same object and effect.

What is claimed is:—

1. In a nailing machine, a nail supply, a plurality of inclined chutes receiving nails therefrom and having slotted bottoms for the shanks of the nails, each of said chutes having a laterally movable portion constituting a side of the chute means for moving all of said movable portions away from the opposite portions to allow the heads of the nails to drop through and nail tubes receiving nails from the lower ends of said chutes.

2. In a nailing machine, a nail supply, a plurality of inclined chutes receiving nails therefrom, nail tubes adapted to be sup-

plied with nails from said chutes, said nail chutes having each a longitudinally movable portion constituting a side of the chute, and means for automatically operating said longitudinally movable portion.

3. In a nailing machine, a nail supply, a plurality of inclined chutes receiving nails therefrom, laterally movable members near the upper ends of the chutes forming portions of the walls of the chutes, automatic means for periodically moving said laterally movable members, longitudinally movable members comprising part of the walls of the lower portions of the chutes, means for automatically moving said longitudinally movable members, and nail tubes adapted to have nails delivered thereto from said chutes.

4. In a nailing machine, a plurality of inclined nail chutes, nail tubes corresponding to the chutes, a horizontal bar extending parallel with the upper ends of said chutes, arms connecting said bar with fixed portions of the frame of the machine, a plurality of tongs carried by said bar, means for swinging said arms to move the tongs

across the upper ends of the nail tubes, a rock shaft journaled in said arms, tongs opening means carried by said rock shaft, and means for rocking said shaft.

5. In a nailing machine, a rotary supply hopper having a plurality of circumferentially arranged supply openings of diamond shape and a plurality of circumferentially arranged adjustable bands having corresponding openings.

6. In a nailing machine, a feed hopper, a plurality of nail delivery chutes beneath said hopper, an inclined distributing tray interposed between said hopper and chutes, spring arms supporting said tray, and means for moving said tray laterally and then suddenly releasing it to allow it to vibrate.

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

DONALD JOHN GUNN MILLER.

Witnesses:

SOMERVILLE GOODALE,
ANDREW TAYLOR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."