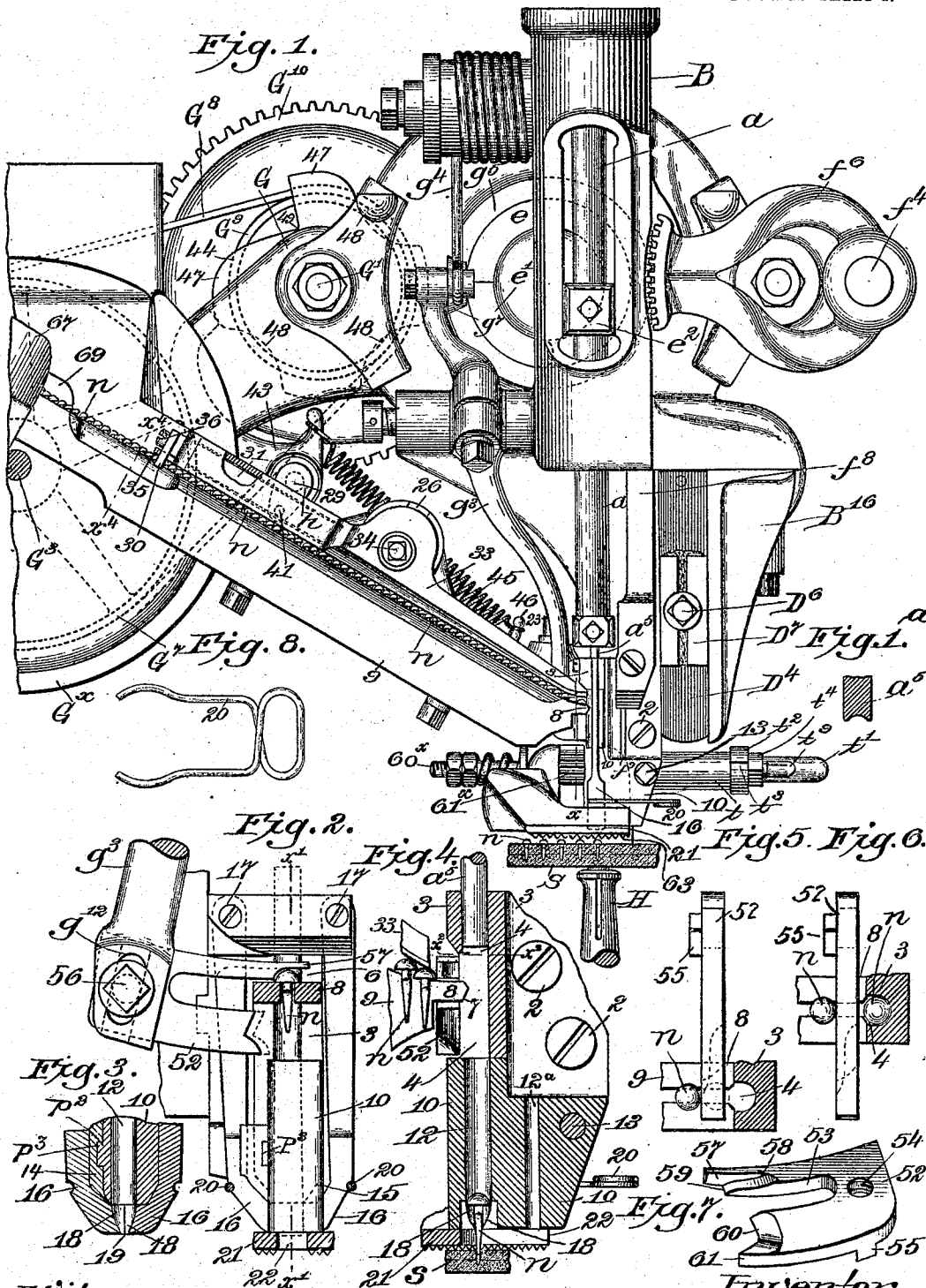


L. A. CASGRAIN.
MACHINE FOR DRIVING FASTENINGS.
APPLICATION FILED APR. 27, 1900.

932,535.

Patented Aug. 31, 1909.

2 SHEETS—SHEET 1.



Witnesses:
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W. C. Sims for.

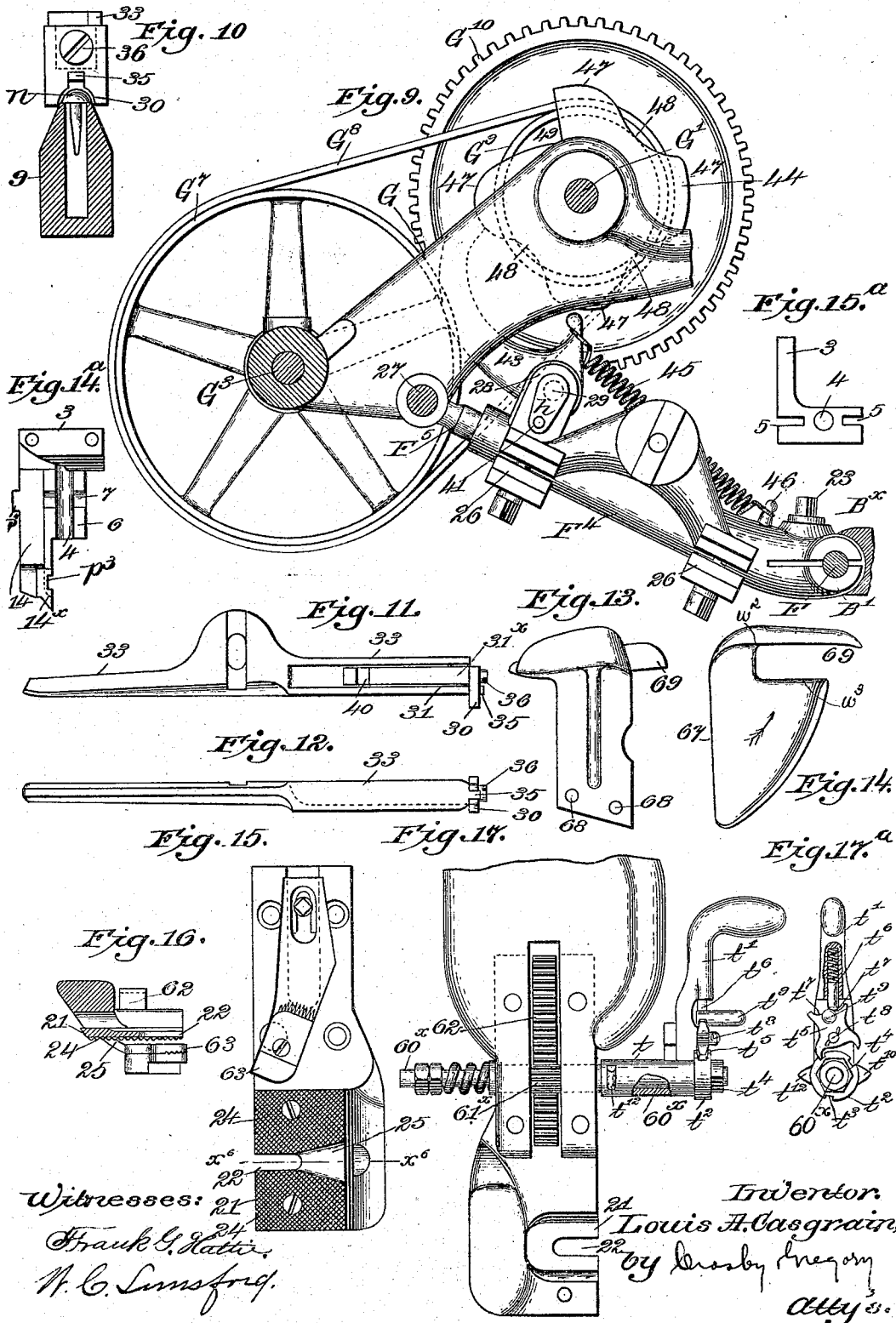
Inventor:
Louis A. Casgrain,
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

LOUIS A. CASGRAIN, OF WINCHESTER, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR DRIVING FASTENINGS.

932,535.

Specification of Letters Patent. Patented Aug. 31, 1909.

Application filed April 27, 1900. Serial No. 14,561.

To all whom it may concern:

Be it known that I, LOUIS A. CASGRAIN, a citizen of the United States, residing at Winchester, county of Middlesex, State of Massachusetts, have invented an Improvement in Machines for Driving Fastenings, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to machines for inserting fastenings and particularly to that type of machines for inserting fastenings known as "loose nailing machines."

An object of the present invention is to provide a loose nailing machine which will operate uniformly and efficiently with nails having comparatively large heads, such, for example, as Hungarian nails or hobnails. Loose nailing machines comprise usually a driver and driver passage, a nail raceway arranged to conduct nails from a suitable source of supply to a point adjacent to the driver passage and a separator operating to cause the nails to be delivered one at a time from said raceway to said driver passage. Machines of this type which will operate efficiently with nails having heads of ordinary size have been found as a rule to be unsatisfactory in operation when nails having large heads are provided.

One of the chief difficulties to be overcome in providing a machine for operating successfully upon nails having large heads is that of separating readily the endmost nail in the raceway from the others and causing it to be delivered into the driver passage with its shank in substantially a vertical line beneath the driver. This difficulty is due primarily to the fact that the weight of the head of the nail is great as compared with the weight of the shank. In the ordinary loose nailing machine it has been customary to provide a nail separator which operates only upon the shank of the nail. Inasmuch as the inertia of the head of a Hungarian or other large headed nail is much greater than that of its shank, these separators have been found very unsatisfactory in operating upon such nails since they tend in their operation simply to tip

the nail without effecting a positive separating movement thereof.

An object of the present invention, therefore, is to provide a nail separator which will operate effectively upon nails having comparatively large heads, and to this end in the preferred embodiment of the invention a separator has been provided which acts upon the heads of the nails.

Although in the preferred embodiment of the invention the separator is constructed to effect its separating operation primarily by engagement with the side of the head of the nail to be separated, nevertheless in order to insure a more perfect delivery of the nail to the driver passage and to insure that the shank of the nail shall be in a vertical line beneath its head and likewise in a vertical line beneath the driver, the separator is preferably provided also with a part which engages the shank of the nail. The part upon the separator which engages the head of the nail and the part which engages the shank are preferably so positioned with respect to each other and with respect to the direction of movement of the separator that, in operation, the head of the nail is first engaged. To aid further in properly positioning the shank of the nail beneath its head the separator is preferably provided also with a part which overlies and preferably engages the upper surface of the head of the nail to be separated.

The invention includes also a novel timing of the operations of the driver and the separator whereby the nail is maintained in proper position for the action of the separator until the engagement therewith of said separator and whereby cramping of the nail between the separator and driver is prevented. To this end the separator is arranged for a two-step separating movement with a dwell between the steps to permit the driver to rise to clear the driver passage for the reception of the nail to be separated. The first step of the separating movement of the separator comprises preferably the engagement of the separator with the head of a nail to be separated, and the second step, following the dwell during which the driver rises to clear the driver passage and

to release the nail, comprises preferably the further movement of the separator to force the nail from the raceway into the driver passage.

- 5 A further object of the invention is to provide means for maintaining the separated nail in proper position for the action of the driver. In the preferred embodiment of the invention the lower end of the driver passage is provided with jaws having opposed
10 recesses which together constitute a cup-shaped passage adapted to receive and retain the head of the separated nail while the shank of the nail projects through between
15 the jaws. These jaws are preferably yieldingly maintained in contact with each other whereby they may be readily opened by the action of the driver upon the nail in the driving operation and whereby they
20 serve to hold the nail in its upright position.

A further difficulty to be overcome in providing a successful machine for handling large headed nails is that of properly supplying the raceway with nails and of positioning the nails properly in or upon the
25 raceway. This difficulty is emphasized in the preferred embodiment of my invention by the necessity of having the heads of the nails properly seated upon the raceway in
30 order that the separator which acts upon the heads may pass readily between the end-most two nails. To insure the removal from the raceway of all nails improperly positioned thereon, including those which have
35 their heads abnormally elevated and those which are lodged on nails hanging properly in the raceway, the preferred embodiment of the invention includes an intermittently operated knock-off device.

- 40 The knock-off device is preferably reciprocated longitudinally of the raceway and, to insure a more effective clearing action, means are preferably provided for imparting to it an irregular or variable throw
45 whereby it has occasionally a longer and sharper stroke than usual to knock off nails improperly lodged which are either not reached or not dislodged by the normal stroke of the knock-off device.

- 50 Besides the several features to the novelty and advantages of which attention has been directed above, the invention includes also novel constructions, combinations and arrangements of parts which aid materially in
55 the production of an efficient machine of this type and to these attention will be directed in the following description and claims.

Figure 1 shows my improvements added to parts of an ordinary nailing machine; 60 Fig. 1^a shows part of the driver in section at its lower end, to represent the concavity therein to fit the nail head; Fig. 2 is a section on the line x Fig. 1, looking to the right; Fig. 3 is an enlarged sectional detail

showing the lower end of the parts represented in Fig. 2; Fig. 4 is a section in the dotted line x^7 Fig. 2, through the foot-plate and nose of the machine, together with the block above it containing the driver passage and part of the end of the raceway and
70 driver, the figure showing how the nails are controlled; Fig. 5 is a partial section in the line x^2 of Fig. 4; Fig. 6 is a similar view of the separator in a different position; Fig. 7 is an enlarged view of the separator; Fig. 75 8 shows the spring 20 detached; Fig. 9 is a detail looking at the front of the machine, the nail-pot and raceway, and part of the rocking lever being omitted, said view being made chiefly to illustrate the raceway holding arm and the device carried thereby for actuating the knock-off device; Fig. 10 is a section of the raceway in the line x^4 Fig. 1; Fig. 11 is an inner side view of the raceway-cap and its contained knock-off
85 device; Fig. 12 is an underside view of said cap; Fig. 13 shows part of a back-plate of the nail-pot and the entire nail-receiving shelf having its shank secured thereto by screws; Fig. 14 is a top view of the shelf shown in Fig. 13 together with a portion of the upper part of the raceway; Fig. 14^a shows the block 3 detached; Fig. 15 is an underside view of the foot-plate and its supporting arm; Fig. 15^a, a top view of
95 the block 3; Fig. 16 is a section in the line x^6 Fig. 15, the parts being, however, right side up; Fig. 17 is a detail showing a portion of the head of the machine to which is attached the arm carrying the foot-plate, 100 and means for adjusting the edge gage with relation to the nail receiving slot of the foot plate; and Fig. 17^a shows the device t^6 looking at it from the right, Fig. 17.

I have herein chosen to illustrate my invention as applied to a machine substantially such as represented in United States Patent No. 490,624, dated January 24, 1893, but it will be understood that my invention is applicable to any usual or suitable "loose
110 nailing" machine.

The rocking or feeding head B, its connected slotted projection B¹⁶ entered by a block D⁷, connected with an arm D⁴ by a screw D⁶, said arm moving the rocking head, 115 the awl bar f^8 having an awl f^9 , said awl bar having teeth to be engaged by the teeth of a segmental arm f^6 , fixed on a rock-shaft f^4 , the driver bar a , having a driver a^5 , said driver bar having an attached block e^2 , the 120 inner end of which is acted upon by a cam e^1 projecting from a cam disk e , carried at the end and forming part of the usual cam shaft of the machine, the said disk having a second cam g^5 acted upon by a roller or 125 other stud g^7 of a separator carrying lever g^3 , the spring g^4 normally acting to keep the said roller stud in contact with said cam,

the arm G mounted loosely on a stud G' carried by the head of the machine, said arm carrying at its opposite end the back G^x of the nail-pot, the shaft G^s extended through a bearing in the free end of the arm G, said shaft having attached to its front end in usual manner the rotating part of the nail pot, not shown, but provided in usual manner with shelves, the rear end of said shaft having fast upon it a pulley G^r, driven by a belt G^s, from a smaller belt pulley G^o connected with and rotated positively in unison with a toothed wheel G¹⁰ mounted on the stud G', said wheel being actuated from a gear carried by the main shaft of the machine, said shaft having the cam for lifting the driver; and the horn H having at its upper end a suitable clenching surface presenting a concavity for the entrance of the point of the nail therein, are and may be all as usual in said "loose nailing machines", or as in said patent. It will be understood in practice that said rocking head pivoted on the head of the machine, will be vibrated in usual manner to enable the awl to feed the stock, that the descent of the driver will be effected by a spring, that the movable part of the nail-pot will be attached to the shaft G^s, and that said parts may and preferably will be actuated in any usual manner.

The lower end of the rocking or feeding head B has attached to it by suitable bolts 2, see Fig. 4, a block 3, which is bored vertically at 4 to constitute a passage for the driver, said block being also provided, see Fig. 15^a, with two like slots 5, the open side of the block being provided with a planed surface 6, see Fig. 14^a having a cross groove 7 to receive a projection 8 from the lower end of the raceway 9, see Fig. 5.

The lower end of block 3 is abutted by a nose or throat block 10, having a driver passage 12 aligned with the driver passage in the block 3, and an awl passage 12^a aligned with the awl carried by the awl bar said nose being connected with said block by a suitable set screw 13. The lower end of the block 3 is provided with an extension 14, cut away, see dotted lines, Fig. 14^a, to constitute a stop 14^x for one of the guides 16 in its closed position, said extension being beveled at its lower end toward the driver passage, and the nose 10 is provided with a like stop 15, see Fig. 2, also preferably beveled and leading to the driver passage.

When the nose 10 is fixed in position with relation to the block 3 the upper end of the nose meets the lower end of the block, as in Fig. 4.

Each of the slots 5 at the upper end of the block 3 receives the upper end of a yielding nail guide 16, said guides being represented as arms mounted to turn about stud screws 17, see Fig. 2, sustained in holes of the block, the

lower ends of said nail guides being shaped to present opposed recesses 18 together constituting a cup-shaped passage, see Fig. 3, to enable the heads of the Hungarian nails to find easy entrance therein and be stopped by contact with said guides, the points of the nails extending through a delivery opening 19, one-half of which is made in each of the two guides, and the point of each nail positioned by said guide may enter partially a hole made in the stock *s* by the awl *f*^o, see Fig. 4. These guides are normally held closed by a suitable spring 20, composed of wire and of a form best represented in Fig. 8, said spring when applied to said arms preferably surrounding the nose.

The lower end of the nose 10 in the to-and-fro movements of the rocking or feeding head B moves close to the upper side of the foot-plate 21, represented as a steel block slotted at 22 for the entrance of the awl *f*^o and the passage of the nails.

The underside of the foot plate, see Fig. 15, presents a groove 25 substantially in line with the slot thereof in which may travel the large heads of the driven nails, the foot plate at the opposite sides of said slot being preferably serrated as at 24 to thereby better enable it to engage the stock and prevent slipping of the stock under the foot plate.

The raceway 9 is composed of a grooved bar, and in its general construction it is substantially the same as the usual raceway, said raceway having at its rear side suitable projecting dove-tailed blocks which enter correspondingly shaped grooves 26 in split arms of a carrying frame F⁴, see Fig. 9, having at its lower end a split hub B' which embraces tightly a stud F carried by a backward extension B^x of the rocking head B, see Fig. 9, the split hub referred to receiving a suitable clamping screw 23 by which to clamp the stud F.

The upper end of the frame F⁴ has a longitudinal bore which fits over a plunger F⁵, pivoted upon a stud 27 extended from the arm G, carrying the back of the nail-pot.

The frame F⁴ so far referred to is substantially the same as in said Letters Patent, and it is moved to and fro in unison with the feeding head, the frame carrying with it the raceway and moving the upper end of the latter to and fro to a limited extent in the groove between the fixed back-plate and the moving front portion of the nail-pot. Herein I have provided said frame F⁴ with a suitable boss or bosses 28, bored to receive an operative shaft 29, for actuating a knock-off consisting, as shown, of a notched block 30 carried by a slide-bar 31, see Figs. 1 and 11, the latter being represented as entering and sliding freely in a guiding groove made in the rear side of the cap 33, which is fixed in position in the frame F⁴ above the heads

of the nails supported by the raceway, by a suitable bolt 34, said cap acting to cover and keep the heads of the nails *n* in proper arrangement or position with relation one to the other while traveling down the raceway to be taken therefrom, as will be described. The hole in the cap through which the bolt 34 passes is elongated, as shown in Fig. 11, so that the cap and with it the knock-off device may be adjusted toward and from the upper side of the raceway according to the depth of the heads of the nails.

The cap at its underside, see Fig. 12, has a projection 35, which is straddled by the notched block 30, of the knock-off, said block being shaped as best represented in Fig. 10, and being secured to said slide bar by a suitable set screw 36. The block 30 is provided, as herein represented, with a guide-space of a shape substantially the same as the shape of the head of the nail, see Fig. 10, to receive the heads of the Hungarian nails *n*, said block thus constituting a gage.

The head of each nail traveling correctly down the raceway passes through said guide-space in block 30 and under the projection 35 of the cap 33, hereinbefore referred to, said projection entering a notch in the top of said guide-space, a part of the shouldered underside of each nail resting on the raceway and the body of the nail hanging in the slot.

The object of the knock-off is to dislodge any nail or nails overriding the nails properly placed in the raceway, or any nails lodged crosswise and traveling down on the upper part of the raceway, the knock-off being reciprocated longitudinally of the raceway for this purpose. The side of the slide-bar 31 is provided with a groove 40, see Fig. 11, which receives a stud 41 extended from the arm *h* connected with the rock-shaft 29 before referred to.

I have herein provided means for imparting a series of short strokes, and then a long stroke to said knock-off, and to do this I actuate the rock-shaft 29 variably, that is, I impart to it at different times different degrees of motion.

As herein represented, each fourth throw is made longer and sharper than the three preceding, as I find that it is only occasionally that I need the longer and sharper stroke which is intended especially for dislodging nails stuck or misplaced in the raceway.

To actuate the rock-shaft, as stated, I have fixed upon it at one end a U-shaped pawl arm 43, see Figs. 1 and 9, the longer end of which is maintained in contact with a cam 44 by means of a suitable spring 45, fixed at one end to said pawl arm and at its other end to a stud 46 carried by an extension from the frame *F*⁴.

The cam 44, shown by dotted and full lines Figs. 1 and 9, is connected with the pulley *G*⁹ and is of peculiar shape, *i. e.*, it has four like high points 47 and three low points 48 of substantially the same depth, and a fourth low point 49 which is much deeper and sharper, the latter low point presenting an abrupt face to let the arm have a long quick stroke.

The knock-off has imparted to it its operative movement by the spring 45, and such movement takes place when the end of the lever enters said spaces, it getting its greatest throw however when said lever enters the deepest space 49.

The upper side of the lower end of the raceway is shaped to present a seat or rest for the undersides of the heads of the nails coming upon it. Each nail in the raceway except the endmost one is overlapped by the cap.

The lower end 8 of the raceway which enters the notch 7 in the face of the block 3, containing the driver passage, is shaped to present two prongs, the inner side edges of which in line with the raceway grooves are somewhat concaved to present a space, see Figs. 5 and 6, coinciding with the driver passage 4 in said block, so that when the raceway is fixed in its operative position with relation to the block, the driver passage will be unobstructed.

The separator 52 represented more clearly in Fig. 7, is composed preferably of a steel blade having a slot 53 to embrace loosely the lower end 8 of the raceway and cross said end above and back of the point where it enters the notch 7. The separator is attached to the separator actuating lever *g*³ by a suitable screw 56 extended through the lower end of said lever from its left hand side, Fig. 1, and entering a threaded hole 54 in the separator. The rear side of the separator has a tongue 55, see Figs. 2 and 7, which enters a groove in the lever *g*³, as shown in dotted lines in Fig. 2. The screw uniting the separator with said lever is extended through an elongated slot *g*¹² in the lever so that the separator may be adjusted vertically to adapt it to the thickness of the nail head being used.

The separator is of peculiar construction, that is, it has above the slot 53 an extended arm 57 to overlie the top of the head of the nail, and below said projection it has a concave surface 58 reduced to substantially a knife edge 59, and below said slot said separator has a more abrupt inclined edge 60, and a beveled toe 61 extending from the lower end of the same.

Let it be supposed that a series of nails are properly located in the raceway, as represented in Fig. 1, that the driver is down and the separator is in its inoperative position farthest away from the end of the raceway,

and that the arm 57 of the separator stands above the head of the nail which is next the driver and which contacts with the driver. In this condition the driver will be elevated and before the driver rises far enough to take its lower end above the point of the nail the head of which stands against it, the separator will be started forward so that the knife edge 59 of the separator will enter the space between the head of the endmost nail and the one next back of it, as represented in Fig. 5, but the said end does not enter far enough in said space to crowd the endmost nail hard against the driver, for if it should so crowd the nail, the nail would be snapped into the driver passage 4 by the separator as the lower end of the driver rises above the nail, and the nail would rebound and escape from the driver passage. The separator rests temporarily in this condition while the driver continues to rise, the said separator being started forward to complete its stroke immediately as the lower end of the driver passes above the shouldered lower side of the head of the nail, so that said separator acting upon the head of the nail both at its top and side keeps control of the nail and moves it laterally from the delivery end of the raceway into the driver space in the block 3, said nail dropping immediately through said space and entering the space between the lower ends of the spring-held guides 16, and in its descent the point of the nail may enter somewhat a hole made in the stock *s* at the previous descent of the awl in feeding the material over the horn.

The lower end of the driver is shaped to fit the head of the nail, being herein shown as concave, see Fig. 1^a, said end meeting the head of the nail about as the point thereof enters or comes into position above the awl hole made in the stock, said driver driving the said nail from between the guides through the slot 22 in the foot plate and into the stock.

During the time that the driver acts to drive a nail the horn *H* will be pressed upwardly to clamp the stock between it and the underside of the foot plate, and a nail having been driven the horn will be lowered in usual manner for feeding. The feeding is done by the awl *f*^o, it descending and penetrating the stock, after which the rocking head is moved laterally, as provided for in the machines of said Letters Patent #490,624, moving with it the driver bar, and the awl is then elevated and the rocking head is moved to the right viewing Fig. 1, into its starting position, putting the driver above the awl hole previously made in the stock, and thereafter the nail is let off, as hereinbefore described, and is driven.

I am not aware that prior to my invention loose nails have ever been separated from a

raceway by means of a separator which engages the heads of the nails, and I gain very material advantage by providing a device which acts not only against the side of the head but also against the top of the head.

The inclined part of the separator is not in all instances needed, but it is desirable because once in a while a nail might tip so that its shank inclines to the left, viewing Figs. 1 and 4, as for instance, should the head of the endmost nail override the head of the nail next back of it. When the separator has the inclined part 60, 61, all such tipping is entirely corrected. Generally, however, the upper member of the separator will so hold the head as to prevent any such overriding.

It will be noticed that the cap herein represented coöperates with and covers the heads of all the nails from a point within the nail pot, to the delivery end of the raceway, and this is possible because the knock-off is located at the upper end of the cap. Were the knock-off located at some point between the two extremes of the cap, there would be a space in which the heads of the nails might have an opportunity to get out of position and override.

The shaft 60^x mounted in the frame supporting the foot-plate and carrying the gear 61^x in engagement with the toothed bar forming part of the edge gage 63 is extended to the right, viewing Figs. 1 and 17, to receive and sustain loosely a hub *t* having stops *t*¹⁰, *t*¹², and a handle *t*⁷. The handle has a stud *t*⁸ on which is pivoted a double-pointed pawl *t*⁵ having recesses *t*⁷ and a hand piece *t*⁹. The handle *t*⁷ carries a pawl controller *t*⁶ shown as a pin acted upon by a spring, see Fig. 17^a. The end of the shaft 60^x beyond the hub *t* has secured to it a disk *t*² having a plurality of notches represented as three, they designating that number of definite positions to which the edge gage may be rapidly and accurately adjusted by oscillating the handle to and fro between the limits permitted by the stops *t*¹⁰, *t*¹², the operative end of the pawl in the movement of the handle in one direction clicking over a notch. This invention is not, however, limited to the particular disk shown, or to the particular number of notches, and the notches of the disk will be arranged to accord with desired positions of the edge gage with given dimensions of pawl *t*⁵ and the arrangement of the stops.

When the pawl *t*⁵ occupies the position Fig. 17^a, turning the handle *t*⁷ to the left or forwardly causes the movement of the edge-gage away from the operator, but if the pawl is turned about the pivot *t*⁸ by the operator so that the other point of the pawl at the right Fig. 17^a is put in position to contact with a notch of the disk *t*², then

turning the handle to the right will cause the edge-gage to be moved toward the operator, and consequently by means of the handle and pawl the edge-gage may be put
5 into different positions to provide for inserting nails or fastenings into the stock at a greater or less distance from the edge thereof.

The extent of movement of sleeve t is limited by the stops t^{10} and t^{12} , they striking suitable projections of the frame in the forward and backward movements respectively of the handle t' .

The extension of the shaft 60* and the employment of the handle t' to move it, enables the handle, which is frequently grasped to move the edge-gage, to be located at a convenient distance away from the line of movement of said gage and within easy reach of
20 the operator.

A nail-receiving shelf 67, shown partially in Fig. 1 and fully in Figs. 13 and 14, has a rim w^2 and slot w^3 parallel with the nail-receiving groove of the raceway and a wall
25 69 at the rear of said slot, the inner face of said wall being extended above the inner face of the rear wall of the raceway groove. The shank of the nail-receiving shelf (see Fig. 13) has holes that receive screws 68 that enter threaded holes in the back-plate G^* of the nail-pot. Nails deposited on the shelf 67 by the moving member of the nail-pot slide or roll along on said shelf and enter the slot w^3 and thence the groove of the race-
35 way, the wall 69 of the shelf acting as a stop to arrest the nails sliding down the shelf in the direction of the arrow thereon Fig. 14, preventing the nails from jumping over the raceway, and enabling them to fall with their shanks in the slot of the raceway.

The block 10 has at its rear side a rib p^2 , see Fig. 3, which enters the notch p^3 in the extension 14, said extension at its rear side, see Fig. 14^a, having a projection p^4 which
45 enters a suitable horizontal slot in the lower end of the rocking head.

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

50 1. In a machine of the class described, a nail-pot, a raceway, a cooperating, vertically adjustable cap or cover the upper end of which occupies a position in the nail-pot, a notched knock-off device crossing the upper
55 side of the raceway and guided by said cap, and means to move said knock-off device in the direction of the length of the raceway to knock off and discharge therefrom nails so sustained as to prevent their proper entrance between the cap or cover and top of
60 the raceway.

2. In a machine of the class described a nail raceway, a nail cap upon said raceway, a vertically adjustable knock-off device

mounted on said cap to reciprocate longi- 65 tudinally of and parallel with the upper surface of the raceway, and means independent of said nail cap for reciprocating said knock-off device, said means being constructed and arranged to permit vertical 70 adjustment of said knock-off device to adapt it to nail heads of various sizes.

3. In a machine of the class described, a nail raceway, a nail cap upon said raceway, a vertically adjustable knock-off device 75 mounted on said cap to reciprocate longitudinally of and parallel with the upper surface of the raceway, means separate from said before-mentioned parts for actuating said knock-off device and operative connections 80 between said means and said knock-off device having provision for vertical adjustment of said device.

4. In a machine of the class described a nail raceway, a cap upon said raceway constituting a guide for the nails traveling 85 down the raceway, a vertically adjustable knock-off device mounted on said cap to reciprocate longitudinally of and parallel with the upper surface of the raceway and 90 having a portion constructed both to gage the nails passing beneath said cap and to remove the irregular and the improperly placed nails, and means to reciprocate said knock-off device, said means being constructed and arranged to permit vertical ad- 95 justment of said knock-off to adapt it to nail heads of various sizes.

5. In a machine of the class described, a raceway, means to supply nails thereto, a 100 longitudinally grooved cap for said raceway, a slide bar located in said groove and carrying a notched knock-off device embracing the upper side of the raceway, combined with a rock shaft having an arm connected 105 loosely with said slide bar, and means to move said rock shaft.

6. In a machine of the class described, a raceway, combined with a knock-off device, and means to impart to the same intermit- 110 tingly a variable throw whereby the heads of nails improperly placed in the raceway may be dislodged.

7. In a nailing machine, a raceway, a notched knock-off device, a stationary guide 115 embraced by said knock-off device, means to adjust said guide and with it said knock-off device toward and from the upper side of the raceway, and yielding means to move said knock-off device toward the upper end 120 of said raceway to remove therefrom improperly lodged nails.

8. In a machine of the class described, a raceway, a separator having means for engaging the side and top of the head and the 125 shank of the endmost nail in the raceway to maintain said nail in a vertical position, and means for actuating said separator to dis-

charge said nail from the raceway, said separator when in its operative position acting as a stop for the nails back of said endmost nail.

9. In a machine of the class described, a raceway, and a separator shaped to enter between the heads of adjacent nails and to overlap the head of the nail to be discharged from the raceway.

10. In a machine of the class described, a raceway, combined with a separator having a projection to overlap the upper side of the head of a nail and presenting a cam-shaped point to contact with the side of the head of the nail, and means to actuate said separator to discharge nails from the raceway.

11. In a machine of the class described, a raceway to present and sustain headed nails, and a separator shaped to act upon the top and side of the head and on the shank of a nail.

12. In a machine of the class described, a raceway to present headed nails, a separator shaped to overlap the head of a nail, and means for actuating the separator to discharge nails from the raceway, said separator having provision for adapting it to nail heads of different size.

13. In a machine of the class described, a raceway to present headed nails, a separator shaped to overlap the head of each nail, an arm or carrier to which said separator is connected, and means to adjust said separator on its carrier to adapt it to heads of different size.

14. In a machine of the class described, a raceway and a separator having a projection to enter between two nails, and an arm to overlie the head of one of the nails.

15. In a machine of the class described, a nail-pot, a raceway entering said nail-pot loosely, a nail receiving shelf sustained by said nail-pot and overlapping the raceway, said shelf having a slot parallel with the raceway, and a wall standing above the same, the inner face of said wall being located above the rear wall of the raceway.

16. In a machine of the class described, a nail-pot, a raceway, a nail-cap, the upper end of which occupies a position within the nail-pot, cooperating with the face of said raceway and adjustable relatively to said face, a movable knock-off device guided by said cap, and means for reciprocating said knock-off device relatively to said cap and raceway.

17. In a machine of the class described, the combination with a nail-raceway, of a longitudinally grooved cap therefor to constitute a guide under which the heads of nails may pass, a slide in said groove carrying a notched knock-off device embracing the upper side of said raceway, and means for actuating said device.

18. In a machine of the class described, the combination with a nail raceway, of a cap therefor, said cap being provided with a plurality of guides, a slide directed in its movements by one of said guides, and carrying a notched knock-off device directed by another of said guides and embracing the upper side of said raceway, and means for actuating said device.

19. In a machine of the class described, the combination with a nail-raceway, of a knock-off device therefor, and means constructed and arranged to impart to said device a series of impulses of varying force in a prearranged order.

20. In a machine of the class described, the combination with a nail-raceway, of a knock-off device therefor, and means for imparting thereto intermittently a variable throw, said means comprising a cam and operative connections between said cam and knock-off device.

21. In a machine of the class described, a nail-raceway, a separator, and means for moving said separator behind the endmost nail in the raceway to discharge the same, said separator being constructed and arranged to overlie and engage the head and also engage the shank of the endmost nail thereby to maintain it in a vertical position while being discharged.

22. In a machine of the class described, a driver and driver passage, a nail raceway, a separator and means for moving said separator behind the endmost nail in the raceway to separate it from the others said nail being at such time in contact with the driver and said separator being constructed and arranged to engage both the head and shank of said nail and maintain it in a vertical position while the driver is ascending to clear the driver passage and to feed it forward, still maintained in a vertical position, only after the driver has ascended there being a dwell in the movement of the separator after it has engaged the nail.

23. In a machine of the class described, the combination with a driver, a part provided with a passage for said driver and a raceway, of a separator arranged for a two-step separating movement comprising an initial movement while the driver is depressed and a second movement continuous in direction with the first but following an intervening dwell to permit the driver to rise to release the nail to be separated, and means for actuating said separator.

24. In a machine of the class described, the combination with a driver, a part provided with a passage for said driver, and a nail raceway, of a separator arranged for a two-step nail-separating movement, comprising an initial movement to separate the endmost nail in the raceway from the others,

a dwell to permit the driver to ascend to clear the driver passage and a further movement to force the separated nail into the driver passage, and means to actuate said separator.

25. In a machine of the class described, the combination with a driver, a part provided with a passage for said driver and a nail raceway, of a separator arranged to move between the endmost two nails in the raceway while the driver covers the end of the raceway, to rest in this position while the

driver rises to release the endmost nail and then again to move and force said nail into the driver passage, and means for actuating said separator. 15

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

LOUIS A. CASGRAIN.

Witnesses:

GEO. W. GREGORY,
MARGARET A. DUNN.