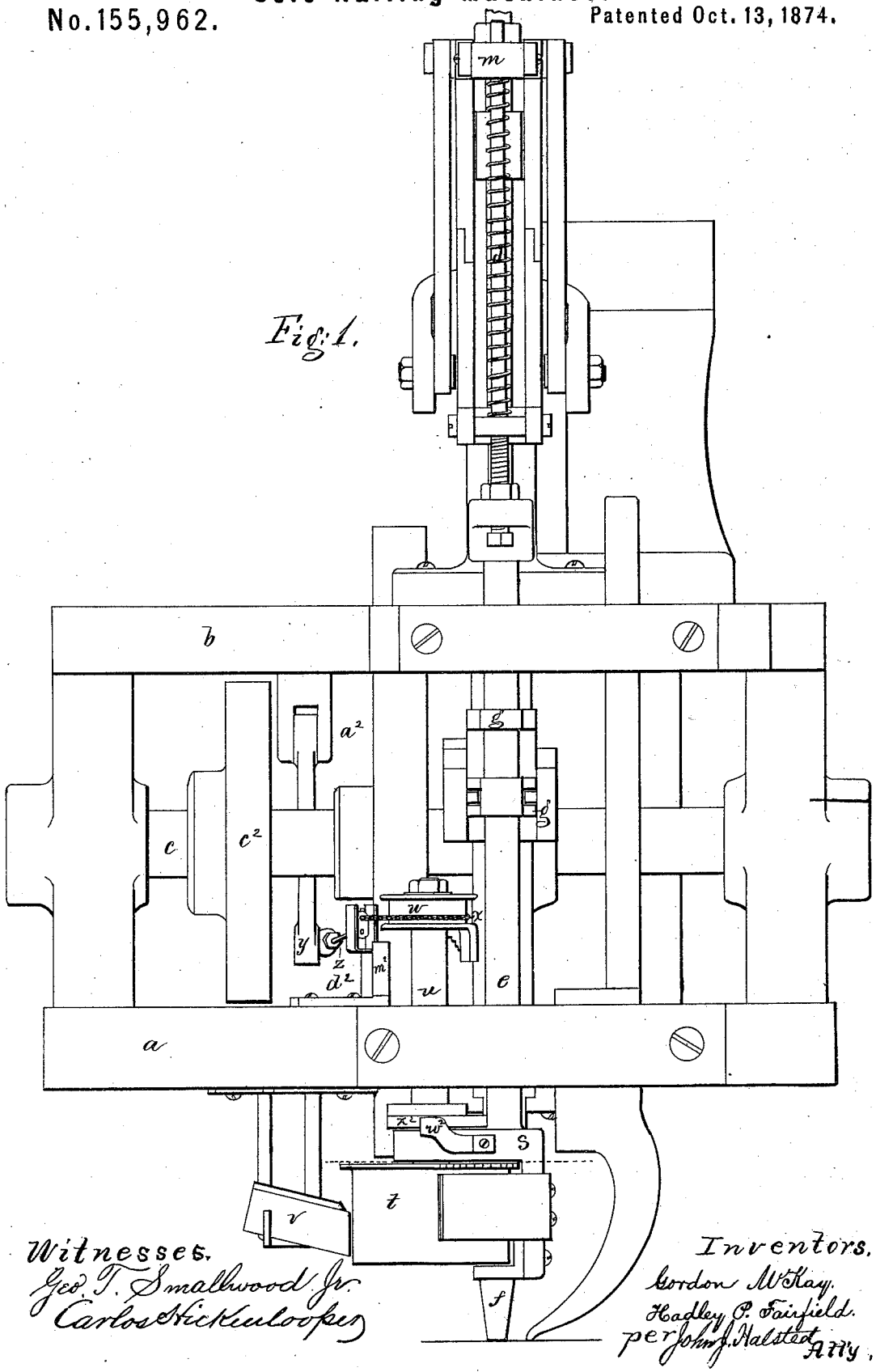
4 Sheets--Sheet 1.

G. McKAY & H. P. FAIRFIED.

Sole-Nailing Machines.

No. 155,962. Patented Oct. 13, 1874.

Fig. 1.



Witnesses.
Geo. T. Smallwood Jr.
Carlos Hickenlooper

Inventors.
Gordon McKay.
Hadley P. Fairfield.
per John J. Halsted Atty.

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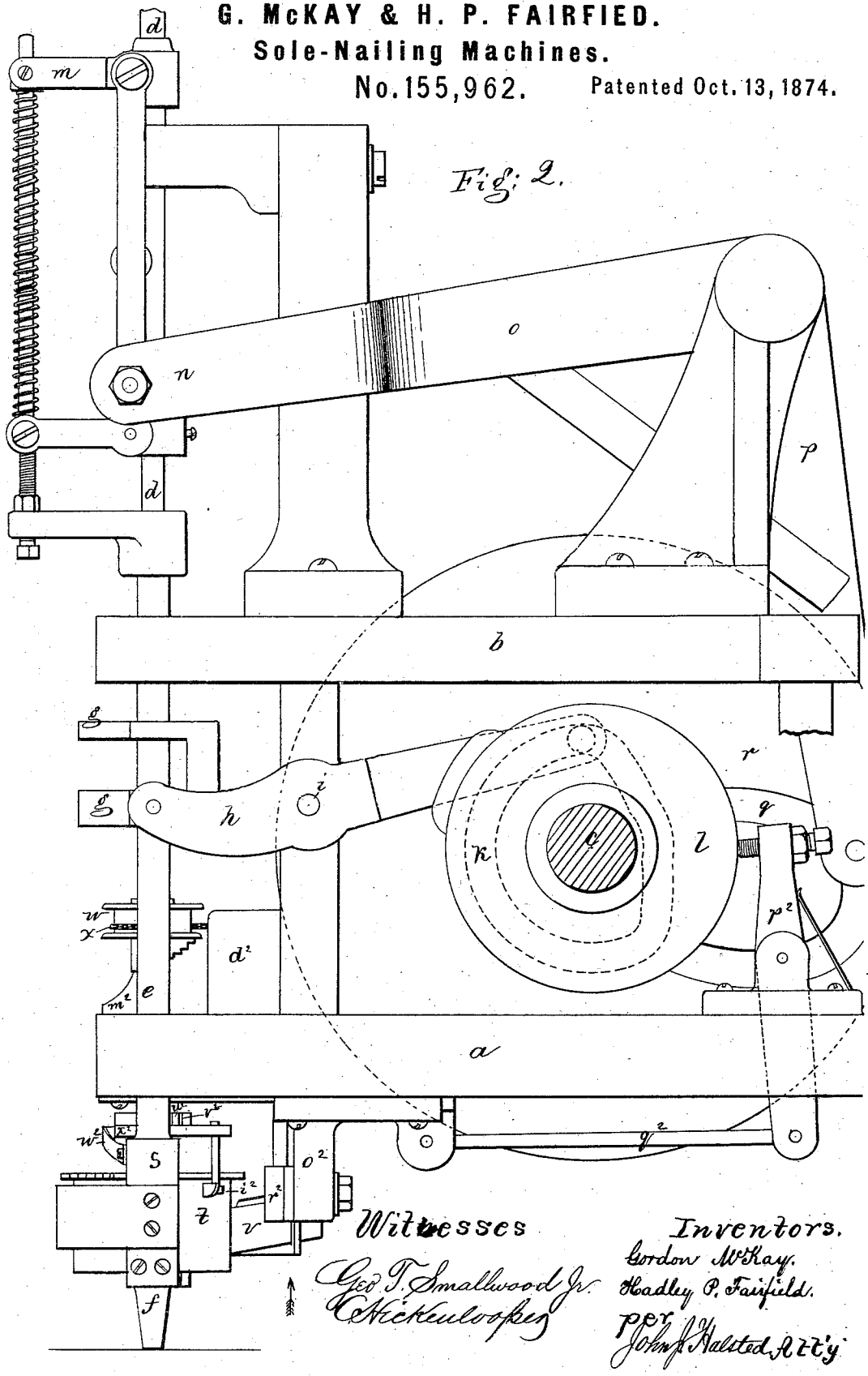
Fig. 2.



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Geo. T. Smallwood Jr.

C. Nickenloopey

Inventors.

Gordon McKay.

Hadley P. Fairfield.

per John J. Halsted. Att'y

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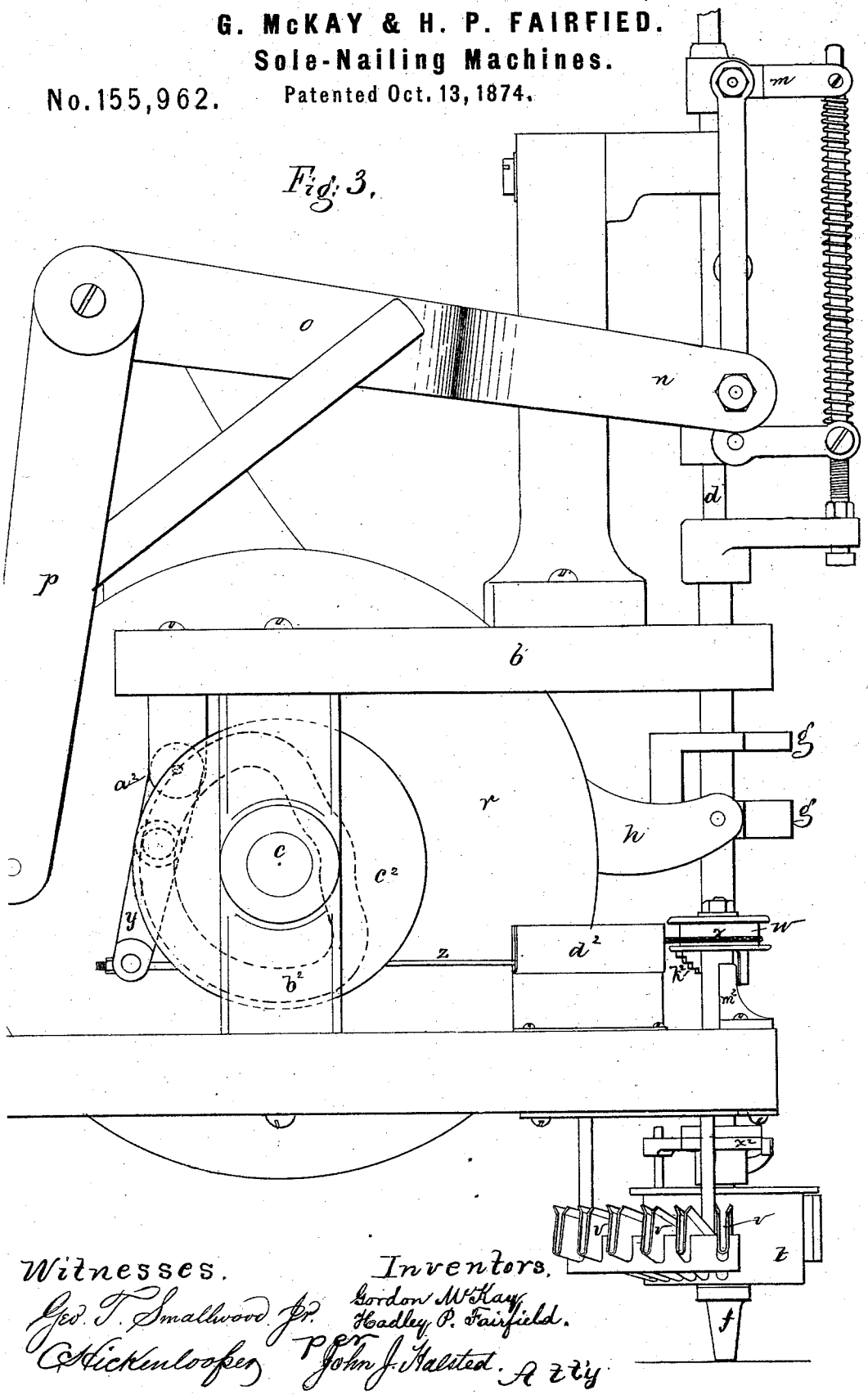
Fig. 3.



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Hickenlooper

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Fig. 4.

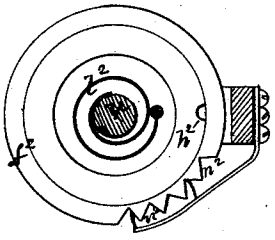
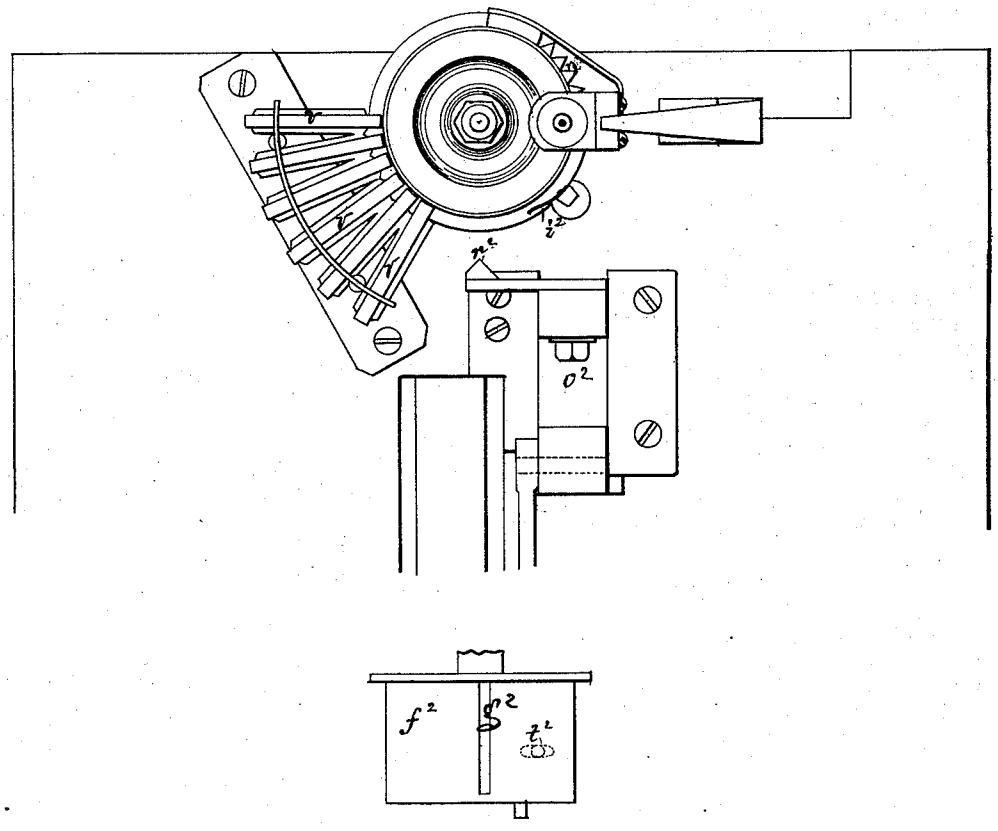


Fig. 5.



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Geo T Smallwood Jr.
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Inventors.
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per J. Halsted. Atty.

UNITED STATES PATENT OFFICE.

GORDON McKAY, OF CAMBRIDGE, AND HADLEY P. FAIRFIELD, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO GORDON McKAY.

IMPROVEMENT IN SOLE-NAILING MACHINES.

Specification forming part of Letters Patent No. **155,962**, dated October 13, 1874; application filed July 24, 1874.

To all whom it may concern:

Be it known that we, GORDON McKAY, of Cambridge, Middlesex county, and HADLEY P. FAIRFIELD, of Boston, Suffolk county, all in the State of Massachusetts, have invented certain Improvements in Nailing-Machines; and we do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of our invention sufficient to enable those skilled in the art to practice it.

The invention relates to the organization of that class of sole-nailing machines in which, the parts to be united being of varying thickness, each nail unites such parts as correspond in thickness to the length of such nail. Heretofore the nail in such machines has usually been cut in the machine to the length required by the thickness of the particular parts to be united by it, such nails being sometimes cut from a continuous wire, and sometimes from a continuous or ribbon-like plate; but in the present invention the nails are formed of different lengths prior to entering the machine, and with or without heads, and are placed in respective pockets or receptacles attached to the machine, from which they are automatically removed and transferred to position to be driven, and so that the sole and upper are united by metal fastenings, each corresponding in length to the thickness of parts to be united by it.

Our invention consists primarily in the combination, with a nail-driving mechanism and a mechanism that automatically determines the position of the upper surface of the parts to be united, of a transfer mechanism, which selects a nail of proper length for the thickness of the parts to be united by it, and carries it into position to be driven.

The drawing represents the part of the machine which directly embodies the organization and details of organization embracing our invention.

Figure 1 shows the mechanism in front elevation. Fig. 2 is a side view thereof. Fig. 3 is an opposite side elevation. Fig. 4 is a plan of the nail receiving and transferring mechanism. Fig. 5 is a reverse plan of the same, seen in the direction of the arrow in Fig. 2.

a b denote two pillar-plates, which, with the stand upon which the lower plates rest and the pillars upon which the upper plates rest, constitute the stationary frame-work of the machine. *c* denotes the driving-shaft, journaled in suitable stationary bearings. At the front of the frame-work is a tube, *e*, extending through the lower pillar-plates *a b*, and having extending through it the shank or driver-bar *d*. The tube *e* has at its bottom a nail tube or foot, *f*, and the mechanism that receives and presents the nails to be driven. Said tube is fixed to arms *g*, through which (by a lever, *h*, jointed to one of the arms, and fulcrumed at *i*) the nail-tube foot is raised and lowered—the lever having extending from its rear arm a pin or roll, that enters a cam-groove, *k*, cut in the side of a cam-wheel, *l*, on the driving-shaft—by a peculiar mechanism, such as may be seen in United States Letters Patent No. 76,150.

The nail-tube, at each lift thereof by the lever *h*, raises the nail-tube foot above the surface of the shoe to a determined distance, while at each descent thereof it rests upon the surface of the shoe, at whatever height such surface may be, thereby calipering the thickness of the parts to be nailed between the nail-tube foot and the work-support, the latter being always in a fixed stationary position when the nail-tube foot descends upon it.

It is by such devices that we are enabled to supply nails in varying length, accordingly as the parts to be nailed vary in length.

The driver-bar is fastened at its upper end to an arm, *m*, extending from an arm, *n*, of a lever, *o*, whose other arm, *p*, has a roll or pin extending from it into a cam-groove, *q*, of a cam-wheel, *r*, on the driving-shaft *c*. The bar *d* is directly fastened to the arm *m*, or through an intervening connection, as seen in the drawing. In the intervening connection a supplementary bar and tripping mechanism are used, so that the driver-bar, as it descends, is stopped when the bottom of the driver-bar meets the upper surface of the work, or, in other words, when the driver has driven the nail through,

so that the outer end of the nail and the outer surface of the shoe are flush.

This tripping mechanism has already been described in an application for a patent made, or to be made, by us, and need not herein be further alluded to.

The nail-tube below the bottom pillar-plate has a vertical arm, *s*, which extends around a carrier or box, *t*, through and by which the nails are transferred from the nail-receptacles to the nail-tube, the tube *e* extending through the pillar-plate into the arm, which has a passage for the driver, and thence into and through a vertical passage made through the nail-carrier, and thence into the nail-tube foot, the nail-passage being through the top of the carrier and the side, and thence into the nail-tube foot, the passage being in the axial line of the driver-tube *e*. The nail-carrier *t* is fixed on the foot of a vertical shaft, *u*, extending through a bearing in the arm *s*, and also through a bearing in the bottom pillar-plate, in which latter bearing the shaft is made movable vertically, while it is made rotative in both bearings. On the side of this carrier *t*, opposite the nail-tube, is a series of vertical pockets or nail-receptacles, *v*, which are stationary. These receptacles vary in depth, and contain nails of various lengths, placed in them in accordance with the length of the respective nails to be used and the corresponding depth of the respective pockets. The nail-pockets converge toward the nail-box, and preferably descend toward it, as seen in Fig. 3. The nail-box shaft *u* has fixed upon its upper end a wheel, *w*, upon which winds a chain, *x*, connected to the bottom of a lever, *y*, by a suitable rod, *z*. This lever is fulcrumed at its upper end, as seen at a^2, and between its upper end and the rod *z* it has a pin or roll extending from it into a cam-groove, b^2, in one face of a cam-wheel, c^2, fixed on the driving-shaft. The chain-wheel is made with a groove and flanges that allow the chain to slip vertically without running off the wheel, and a guide, d^2, may be used to keep the chain and rod in position.

Before the shoe to be nailed is fed forward, after a nail is driven, the nail-tube and box are raised to permit free movement of the shoe; and as the nail-tube, after the feed of the shoe, is thrown down by the lever *h*, the nail-tube stops at the point where it strikes the upper surface of the upper sole, such point being higher or lower, accordingly as the parts to be united are more or less thick. This leaves the nail-carrier, which moves vertically with the nail-tube, more or less near to the bottom of the lower pillar-plate, and through the position of the box, with relation to the lower pillar-plate, a nail of greater or less length is taken from the nail-receptacle, the connection for effecting the result being as follows: The box or carrier *t* is formed in two cylindric parts or rings. In the outer ring, f^2, is a vertical slot, g^2, extending through the ring and to the outer surface of the inner ring, in which surface is a vertical groove, h^2, that forms a part of the nail-tube, when the parts are in position to bring the groove into line with the nail-tube; while, when the carrier is turned so as to bring the slot and groove opposite the nail-receptacles, the slot is open through to the groove, a suitable spring or finger, i^2, then pressing a nail from one of the receptacles through into the nail-receiving groove h^2 of the carrier. The nail having been thus placed, the shaft *u* is turned, bringing the nail-groove h^2 and its nail into vertical line with the nail-tube above and the nail-tube foot below, suitable devices holding the parts in relative position for the action of the mechanism in receiving a nail, and in transferring it to position where it is received, and to position when it is driven.

The mechanism for selecting from the nail-receptacles a nail corresponding most nearly to the thickness of the material, and its operation, is as follows: On the under side of the chain-wheel *w* is a series of circular steps, k^2, cut in the ring. These steps differ from one another in height as the nails used in nailing vary in length; preferably, this variation should be one-sixteenth of an inch at each nail-trough, and the horizontal distances of the steps are so arranged that, when the stepped wheel *w* is brought over the nail-receptacles *v*, the vertical lines of the steps and the nail-receptacles will correspond radially. The chain *x*, which is worked by the cam c^2, revolves the wheel *w* in one direction, while it is moved in the other direction by the coiled spring l^2; thus its rotation, by means of the spring, may be arrested in any position, or when the groove g^2 is opposite any of the nail-troughs *v*. There is a stop, m^2, fixed to the plate *a*, against which one of the circular steps k^2 strikes when the carrier f^2 is rotated by the coiled spring, and the height of the wheel *w* determines which of the steps shall arrest the rotation of the wheel *w*, and also of the carrier *t*, and the height of the wheel *w* is determined by the thickness of the stock through the tube *f*. The upper rim of the carrier f^2 has notches n^2 cut in it, corresponding radially with the nail-receptacles *v* and the steps k^2. There is a sliding piece, o^2, worked by a projection on the cam *l* through the lever p^2 and rod q^2, which, at the proper time—*i. e.*, after the nail-chamber h^2 is placed to receive the nail—pushes the V-shaped end r^2 of the sliding piece into one of the notches n^2 in the rim of the carrier, and this brings the slot g^2 opposite the nail-chamber h^2. In order that the receptacle h^2 may pass by the nails presented by the troughs *v* that intervene between the driver and the nail-trough opposite which the receptacle h^2 is stopped by the circular steps—that is, supposing a nail is required from the fifth trough, it must pass the first four without taking in a nail—the outside casing f^2 of the nail-carrier is allowed to move a little over

the inner cylinder, the amount of the motion being regulated by the pin and slot t^2; and when this pin is at either end of the slot the nail-chamber h^2 is closed, therefore the nail-carrier will pass by the first four nails in the case supposed without taking a nail; then, when arrested opposite the fifth nail-trough, the piece o^2 adjusts the opening g^2, and admits a nail, and the rotation of the carrier returning to the driver, closes the opening g^2, and retains the nail in the carrier. There is a spring, i^2, that is carried by the rotation of the flange x^2, through the action of the pin u^2 in the slot v^2, and which is controlled by the friction-pad w^2. This spring being elevated and depressed with the nail-carrier is so adjusted in height that it will pass over the tops of the intervening nails and stop at the one opposite the slot g^2 when that is in position to receive the nail. This spring passes back of this nail, and at the opening of the sot g^2 pushes the nail into the receptacle h^2.

Where nails are to be used, having heads like the heads of wood screws, the spring i^2 should be placed below the nail-troughs, and made to extend upward, and the nails being supported by their heads on the inclined flanges of the troughs may be left with their lower ends projecting or exposed beyond the sides of the nail-troughs, so that the spring i^2, entering between the nail next the nail-carrier and the next one back of it, will, as it passes them, press each one toward the nail-carrier, but the opening g^2 being closed, until after it has been placed in position to take the proper nail, only the right one will be taken into the receiver h^2.

In this machine we use the horn for supporting the shoe described in other United States patents, or the shoe may be held on a last; and we use also an automatic feed like the one described in United States Letters Patent No. 36,163.

We claim—

1. The combination, with a nail-tube and nail-driver, of the nail-receptacles and mechanism, substantially as shown, for transferring the nail from the receptacles to position to be driven, all substantially as and for the purposes described.

2. The combination, with the nail-tube and nail-driver, of nail-receptacles and transferring mechanism, so constructed and arranged, and so operating that the nails are selected in accordance with their respective lengths, and are transferred and positioned to unite parts corresponding in thickness to the length of the respective nails.

3. The combination, of the inner and outer rings in the nail-carrier, with the notched flange and the piece o^2, acting substantially as described, to open the receptacle for the nail after it is in the proper position to receive the nail, and close it when passing the nail-troughs in either direction.

Executed this 18th day of July, A. D. 1874.

GORDON McKAY.

H. P. FAIRFIELD.

Witnesses:

M. W. FROTHINGHAM,
C. WARREN BROWN.