

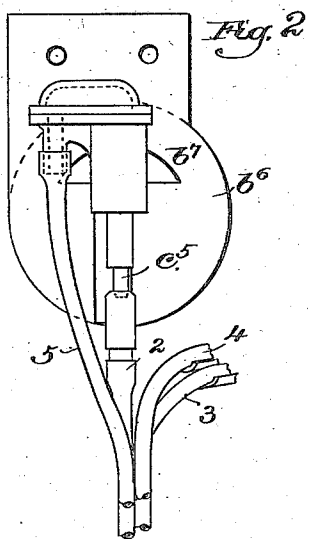
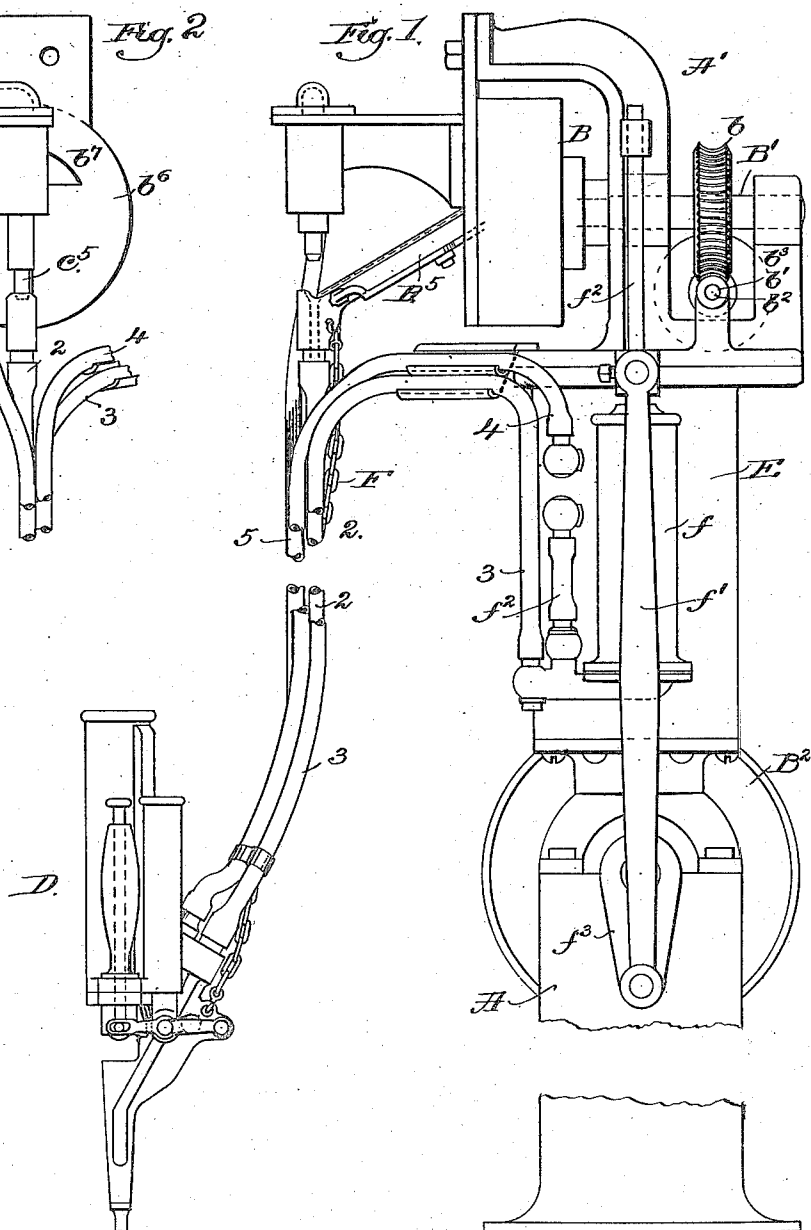
(No Model.)

3 Sheets—Sheet 1.

H. W. DEAN.
NAILING MACHINE.

No. 380,645.

Patented Apr. 3, 1888.



Witnesses.
Fred S. Gledhill.
Fred L. Emery.

Inventor.
Henry W. Dean.
By Leroy Gregory, atty.

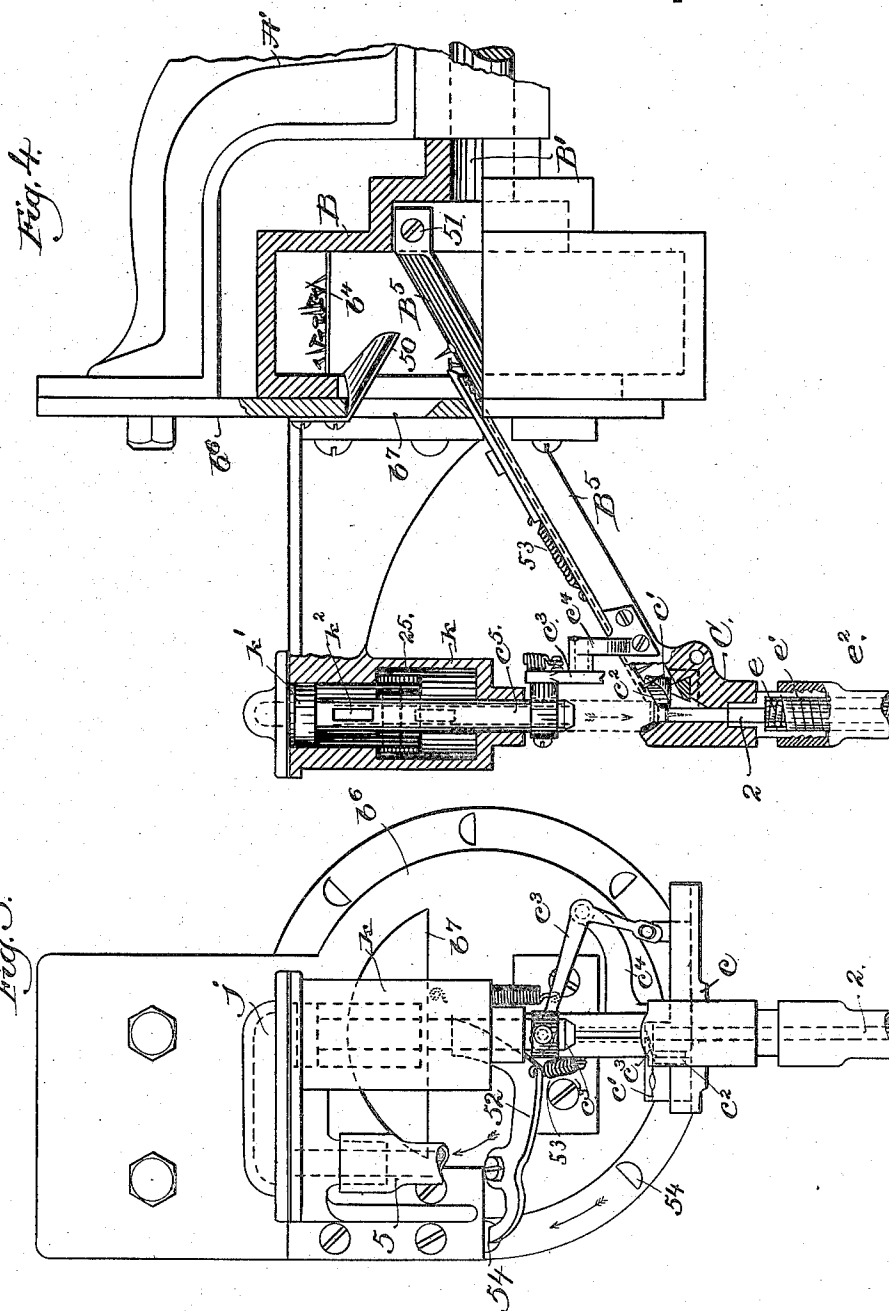
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Fred. S. Greenleaf
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Inventor.
Henry W. Dean
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Attys

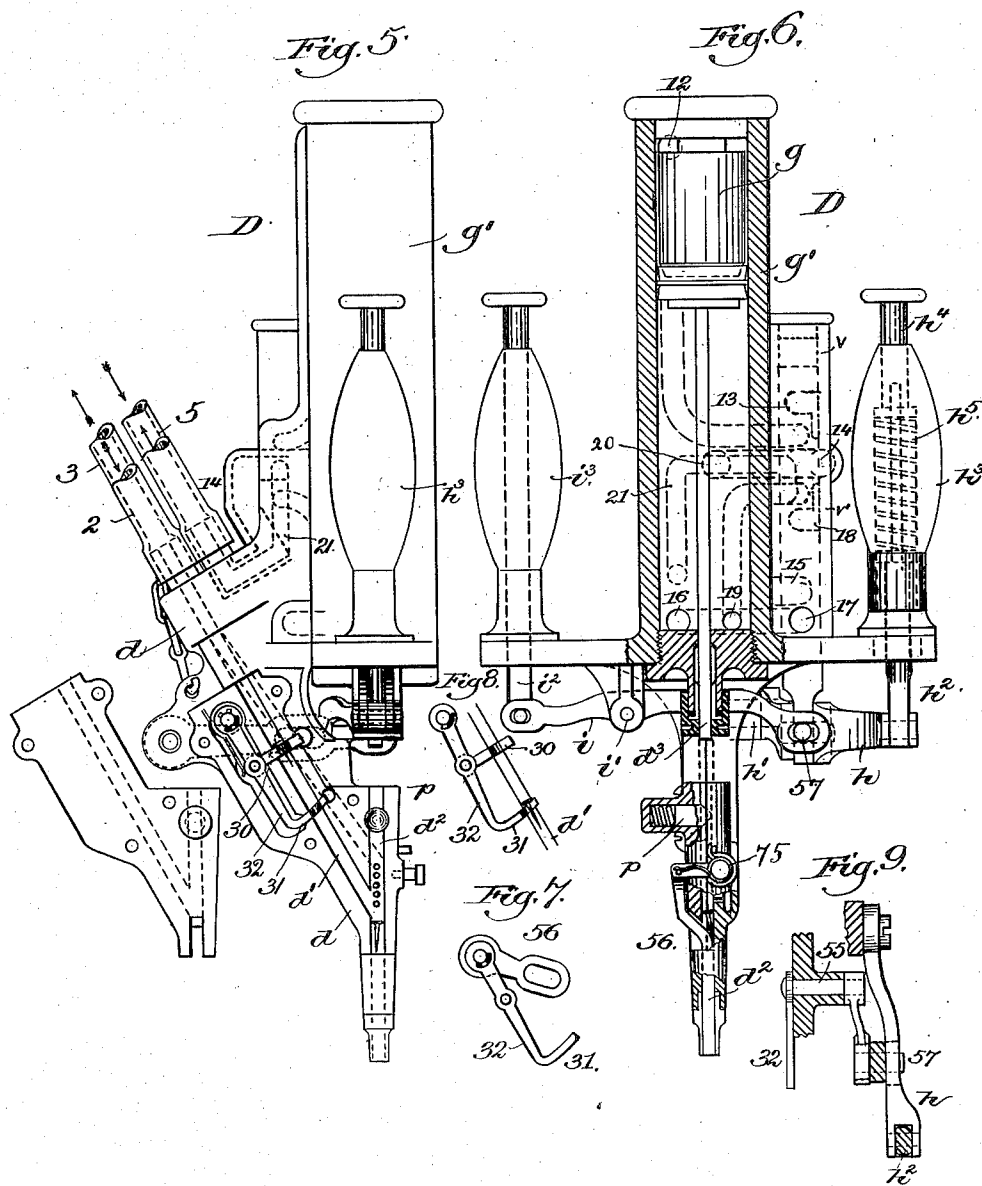
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by Lemby Gregory, Atty.

UNITED STATES PATENT OFFICE.

HENRY W. DEAN, OF SHARON, ASSIGNOR OF TWO-THIRDS TO LEONARD R. LOTHROP, OF LYNN, AND SAMUEL A. BUTLER, OF BOSTON, MASSACHUSETTS.

NAILING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 380,645, dated April 3, 1888.

Application filed June 28, 1887. Serial No. 242,729. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. DEAN, of Sharon, county of Norfolk, State of Massachusetts, have invented an Improvement in Tack-driving-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to construct a machine for driving lasting-tacks, it being adapted to be used in connection with a lasting-machine of any ordinary construction.

In accordance with this invention the tacks are fed from a hopper down an inclined raceway into a flexible feed-tube, said tube forming a continuous passage from the raceway to the tack-driving passage of a universally-movable tack-driving head. Means are provided for exhausting the air from said driver-passage, and hence from the feed-tube communicating with it at its lower end, to thereby form a vacuum within the tube in front of the tack, to thereby aid the forward movement of the said tack, and means are also provided for forcing air into the upper end of said feed-tube above the tack, so that the tack will be positively driven through the flexible feed-tube into the driver-passage directly beneath the driver. The driver is adapted to be moved by compressed air taken from an accumulator or air-reservoir, the driver forcing the tack from the driver-passage into the material, the flow of air being controlled by suitable valves, and the accumulator or air-reservoir is supplied with air by an air-pump of any ordinary construction, the pump taking its air from the driver-passage of the movable driving-head. The air-pump, the accumulator, the tack hopper and raceway, and the operating mechanism therefor are mounted upon a suitable stationary frame-work, and the tack-driving head is connected with said stationary frame-work by a cord or chain, and also by the said flexible tubes, the cord or chain being somewhat shorter than the tubes, so that no strain will come upon the tubes even though the head be moved so that the chain is taut. The flexible tubes are so constructed as to be non-collapsible, as will be described.

Figure 1 shows in side elevation a partially-broken tack-driving machine embodying this invention; Fig. 2, a front elevation of a part of the top portion of the machine, showing the hopper, broken sections of the flexible tubes, and a device for forcing air through the feed-tube; Fig. 3, a similar view to Fig. 2, but on a larger scale, it showing the let-off beveled at the termination of the inclined raceway for the tacks; Fig. 4, a sectional view of the hopper, the raceway, and let-off, and the device for forcing air through the feed-tube; Fig. 5, a side elevation of the movable tack-driving head removed from the main or stationary part of the machine, the plate which conceals the let-off for the tack within the head being removed and shown independently; Fig. 6, a front elevation and partial section of the movable tack-driving head, showing the driver and means for moving it; Figs. 7, 8, and 9, details to be referred to.

The main frame-work of the machine comprises a post or standard, A, and a frame or head, A', secured upon it. A hopper, B, consisting of a hollow shell, is fixed to a shaft, B', having its bearings in the frame A', the said shaft B' having secured to it a worm-wheel, b, which is driven by a worm, b', fixed to a driving-shaft, b'', upon which shaft is secured a pulley, b'', driven by any suitable means, as by a belt which passes around the main drive-wheel B'', fixed to a shaft having its bearings in the base of the post or standard A.

The hollow shell of the hopper B is provided within it with a series of inclined shelves or pockets, b', of usual construction, which receive the tacks and drop them during the rotation of the hopper upon an inclined apron, 50, which, as shown in Fig. 4, is directed backward into the hopper B, so that the tacks falling from it strike upon the upper end of the inclined raceway B', the said raceway being composed, essentially, of two parallel bars extended into the hopper and separated a short distance, so as to leave a tack-receiving slot between them, their free ends being connected by a screw, 51. The open front end or face of the hopper is closed by a plate, b'', secured to the frame A', said plate having an

opening through it at b' for the introduction of tacks into the hopper.

Just above the top of the raceway, within the hopper, I have provided a knocking-off device, shown as a lever, 52, acted upon by a spring, 53, which normally serves to keep the short arm of the said lever pressed against the face of the hopper, it having a series of cam-recesses, 54, the said means and spring effecting the movement of the lever above the raceway and causing it to knock off such tacks as are not properly lodged thereon.

The raceway B^a has at its lower end a suitable let-off consisting, essentially, of a bar, c , having a projecting portion, c' , said bar moving in a block, C . The projecting portion c' is cut away, as at c^2 , (see Fig. 4.) and is provided with a curved slot, c^3 , the upper end of which slot, when the projecting portion c' is in one position, coincides with the groove in the inclined raceway, the lower end of the slot, when the projecting portion c' is moved into its other position, coinciding with a feed chute or tube, 2, so that the tack, arriving at the termination of the inclined raceway, just enters the grooved slot, and, owing to its relative position with the block C , in which it slides, is checked, and as the projecting portion is moved the tack follows down the curved slot until it enters the feed tube or chute 2. While the tack is being conveyed from the raceway to the feed-tube by the let-off, the end of the raceway is closed by the projection c' . The bar c is moved by a bell-crank lever, c^x , pivoted to an arm, c^4 , one arm of the said bell-crank lever being connected loosely with the said bar c , its other arm being connected with a vertically-moving plunger, c^5 .

The feed-tube 2, which receives the tube from and forms a continuation of the raceway, is connected with a tack-driving head, D . (See Figs. 5 and 6.) The tube 2 is flexible, and is herein shown as made of two spiral coils of metal or wire, $e e'$, (see Fig. 4.) wound in opposite directions, one within the other, and inclosed in a rubber tube, e^2 , to thereby form an air-tight tube through which pointed tacks can pass without catching and clogging, the spiral coils giving sufficient transverse rigidity to the tube to prevent its collapse when the air is exhausted therefrom.

The tubes 3, 4, and 5 are of substantially the same construction.

The tack-driving head D is composed of an irregular frame-work, d , having several passages through it, to be described, one of which passages, as d' , forms a continuation of the feed-tube 2 and communicates with the driver-passage d^2 , through which the tack is driven by a driver, d^3 .

To facilitate the passage of the tack through the feed-tube 2, the air is exhausted from the lower end thereof and in front of the tack by a suitable air-pump, f , mounted upon the stationary frame-work A (see Fig. 1) and connected by a flexible tube or pipe, as 3, with the driver-passage d^2 of the head D .

The piston of the pump herein shown is joined to a connecting-rod, f' , extended to a pin of a crank, f^3 , fixed to the main drive-shaft. The air taken from the driving-channel d^2 by a pipe, 3, is forced through a pipe, f^2 , into an accumulator or air-reservoir, E . The driver-bar d^3 is connected with a piston, g , moving in a cylinder, g' , into which air is admitted when the driver-bar is to be actuated. The cylinder g' has an inlet-port, 12, by which air is admitted to the cylinder g' , the admission of the air being controlled by a suitable slide-valve, as v , contained within the valve-case v' , said slide-valve consisting, as herein shown, of a cylindrical plug having several grooves or recesses to co-operate with different ports, to be described.

The valve v is connected loosely with a bent lever, h , pivoted to a shaft, h' , the opposite end of the said lever having attached to it a rod, h^2 , extending vertically within the hand-piece h^3 , secured to the frame-work, and into the upper end of the said hand-piece a thumb-piece, h^4 , is fitted, which is connected by a compression-spring, h^5 , with the rod h^2 , so that by depressing the thumb-piece h^4 the rod h^2 will act to move the lever h on its pivot, thereby moving the valve v so that the passage 13 of the valve connects the inlet-port of the valve-case with the port 12 of the cylinder g' . When the valve v is in this position, the passage 15 connects port 16 of the cylinder g' with the exhaust-port 17 of the cylinder. A flexible tube, 4, connects the accumulator or air-reservoir with the port 14 of the valve-case v' . The valve v is moved to its opposite extreme position by a lever, i , pivoted at i' to the frame-work, one end of the lever being connected loosely with the valve, while its other end is connected with a thumb operated rod, i^2 , contained within the hand piece i^3 , said rod and hand piece being substantially the same as the rod and hand-piece $h^2 h^3$, before described. When the valve v is in its other extreme position, the passage 18 connects the port 14 with the port 19 of the cylinder g' , to thereby move the piston g back to its normal position, and also at such time the D -port 20 connects the port 12 with the passage 21, and the air contained in the cylinder g' is forced by the piston through said passage 21 into the flexible tube 5. The tube 5 is connected with a suitable hollow or recessed block, j , attached to the cylinder k , secured to a stationary part of the machine, the air forced into the tube 5 causing the piston k' of the cylinder k to descend.

The piston-rod of the piston k is tubular and is also provided with openings k^2 , the cylinder k for a portion of its length being made larger in diameter and provided with several guide-ribs, 25, so that when the piston has descended it enters the enlarged part of the cylinder, guided by the ribs 25, permitting the air back of it to pass through the openings k^2 of the tubular rod c^2 . The end of the plunger or rod c^2 is beveled to enter and to be tightly seated when in its lowermost position in the upper

end of the block C of the feed-tube, so that when the piston has moved sufficiently to permit the air to pass through the openings k^2 the plunger is properly seated and the air is forced through the feed-tube, thus aiding the progress of the tack in its passage through the feed-tube in addition to the vacuum previously formed in the lower portion of the said tube ahead of the tack.

Near the termination of the feed-tube 2 and adjacent to the driver-passage d' is placed a let-off device, which consists, as herein shown, of an arm, 32, attached to a rock-shaft, 55, the said arm having a finger, 31, at its lower end and having jointed to it a slide, 30. The shaft 55 has connected to it an arm, 56, provided with a slotted end, which slot receives the pin 57, which also passes through the lower end of the valve v and the lever h , as shown in Figs. 7, 8, and 9, so that when the lever h is depressed by the thumb-piece the let-off will be moved.

The finger 31 and the slide 30 of the let-off have each a hole, the said holes being so arranged relatively each to the other that in the movement of the arm 32 one, but never both, of the said holes will register at the same time. In this way when the arm 32 is in its normal position, as in Fig. 5, the hole in the finger 31 acts to stop the descent of the tack above it, each movement back and forth of the lever h thus permitting, as will be obvious, one tack to pass into the driver-passage. A spring-controlled plug, p , is fitted into one side of the frame, the conical end of the said plug entering the tack-driver passage above the junction of the feed and suction tubes with the driver-passage, the driver-passage below the feed-tube passage 2 having a pivoted valve, 56^x , controlled by a suitable spring, 75. The plug and valve thereby render the driver-passage air-tight, in order that the air may be exhausted from the lower end of the tube 2 through the tube 3. The valve 56^x acts as a check-valve, and its inner or lower end within the driver-passage serves to support the tack next to be struck by the driver, the lower end of the valve being inclined or beveled inwardly to permit the said valve to be pushed back or out of the driver-passage laterally by the tack and driver acting against it. By this arrangement of air-tubes it will be seen that the tack is forced from the feed-tube into the driver-passage and is driven therefrom by the driver, and that the valves controlling the entire flow of air are so located upon the tack-driving head as to be easily accessible to the operator.

The tack-driving head is connected with the stationary part of the machine by a chain, F, which is somewhat shorter than the connected tubes 2 3 4 5, so that no injurious strain can come upon the tubes through movement of the head.

I claim—

1. In a tacking-machine, the flexible tack-conveying tube and a feeding device to feed

tacks singly to the said tube, combined with a suspended head and an attached driver for driving the tacks at any point desired when delivered from the tube, substantially as described.

2. In a machine for driving tacks, the hopper mounted upon a stationary frame-work and a driver carried by a movable head suspended loosely therefrom, combined with a flexible tack-conducting tube connecting the movable head with the stationary frame-work, substantially as described.

3. In a machine for driving tacks, a hopper and an inclined raceway, combined with a flexible tack-conducting tube, a driver carried by a loosely-suspended and universally-movable head, and a let-off between the said tack-conducting tube and driver, substantially as described.

4. In a machine for driving tacks, a hopper, a universally-movable head, and an attached driver, combined with a tack-conveying tube connecting the said hopper and head, and with means, substantially as described, controllable from the movable head to force air into the upper end of said conveying-tube to move forward the tacks contained therein, as set forth.

5. In a machine for driving tacks, a hopper and a universally-movable head and driver, combined with a tack-conveying tube and with an air-exhausting device for exhausting the air from the lower part of the said tube, substantially as described.

6. In a machine for driving tacks, the head provided with the driver-passage, a feed-tube communicating therewith, a driver, and valves for closing the driver-passage simultaneously above and below the junction of the feed-tube therewith, and combined with means for exhausting the air from the lower portion of the feed-tube and in front of the tacks therein, substantially as described.

7. In a machine for driving tacks, a feed-tube and driver-passage with which it communicates, and a let-off device for permitting the tacks to pass from the feed-tube to the driver-passage one at a time, combined with a driver and means, substantially as described, controlling the operation of the driver and let-off device simultaneously, as described.

8. In a machine for driving tacks, a hopper, its stationary frame-work, a driver, and its movable head, combined with a flexible feed-tube and with a pump for exhausting the air from the feed-tube and for operating the driver by compressed air, substantially as described.

9. In a machine for driving tacks, a feed-tube and driver, and a plunger, c' , for closing the upper end of the feed-tube, combined with an air-pump and with several flexible tubes for exhausting the air from the feed-tube from its lower end, causing the descent of the driver, and also for forcing the air into the feed-tube at its upper end, substantially as described.

10. In a machine for driving tacks, a hopper

and raceway, a let-off valve mounted upon a stationary frame-work, the driver carried by a movable head, and a flexible feed-tube, combined with an air-pump and with pipes by which air is exhausted from the feed-tube at its lower end and forced into a cylinder to cause the descent of the driver, and with valves also carried by the movable head for controlling the flow of air.

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

HENRY W. DEAN.

Witnesses:

BERNICE J. NOYES,
C. M. CONE.