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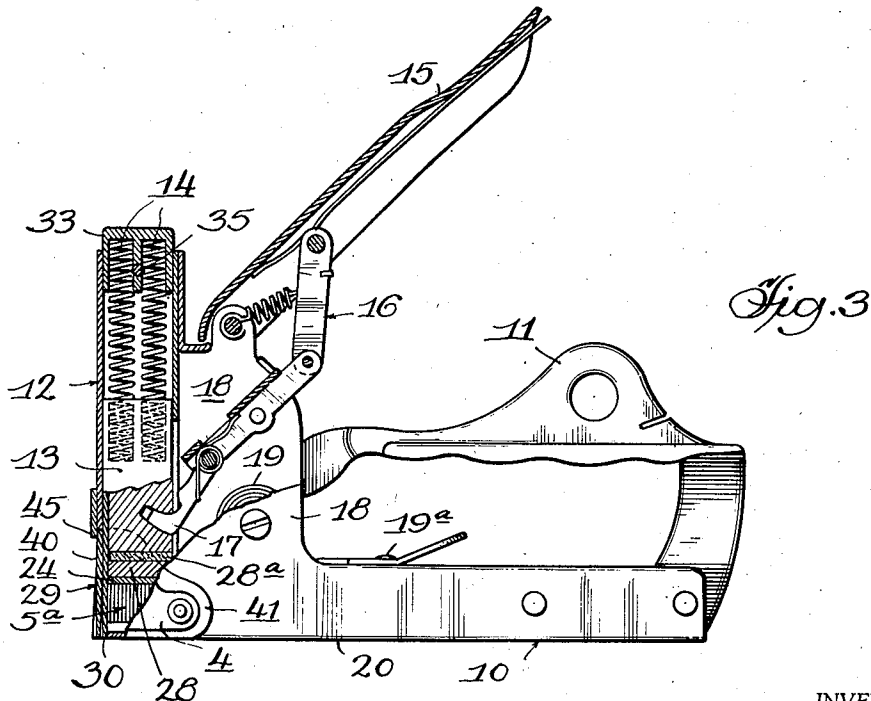
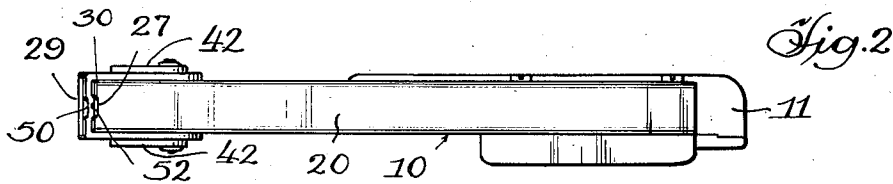
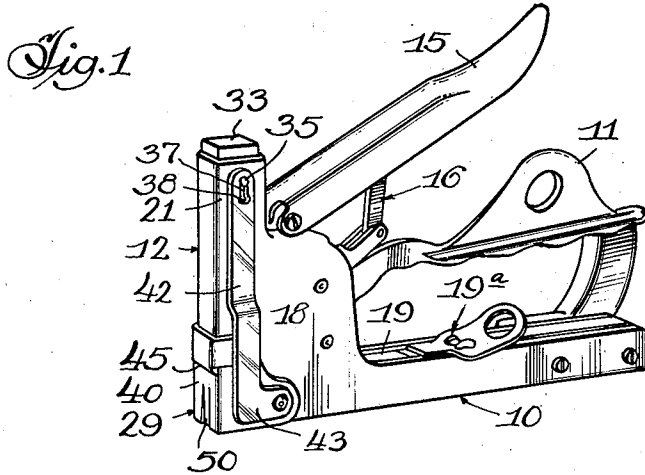
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2,300,277

PIN DRIVING MACHINE

Filed March 15, 1940

3 Sheets-Sheet 1



Witness:
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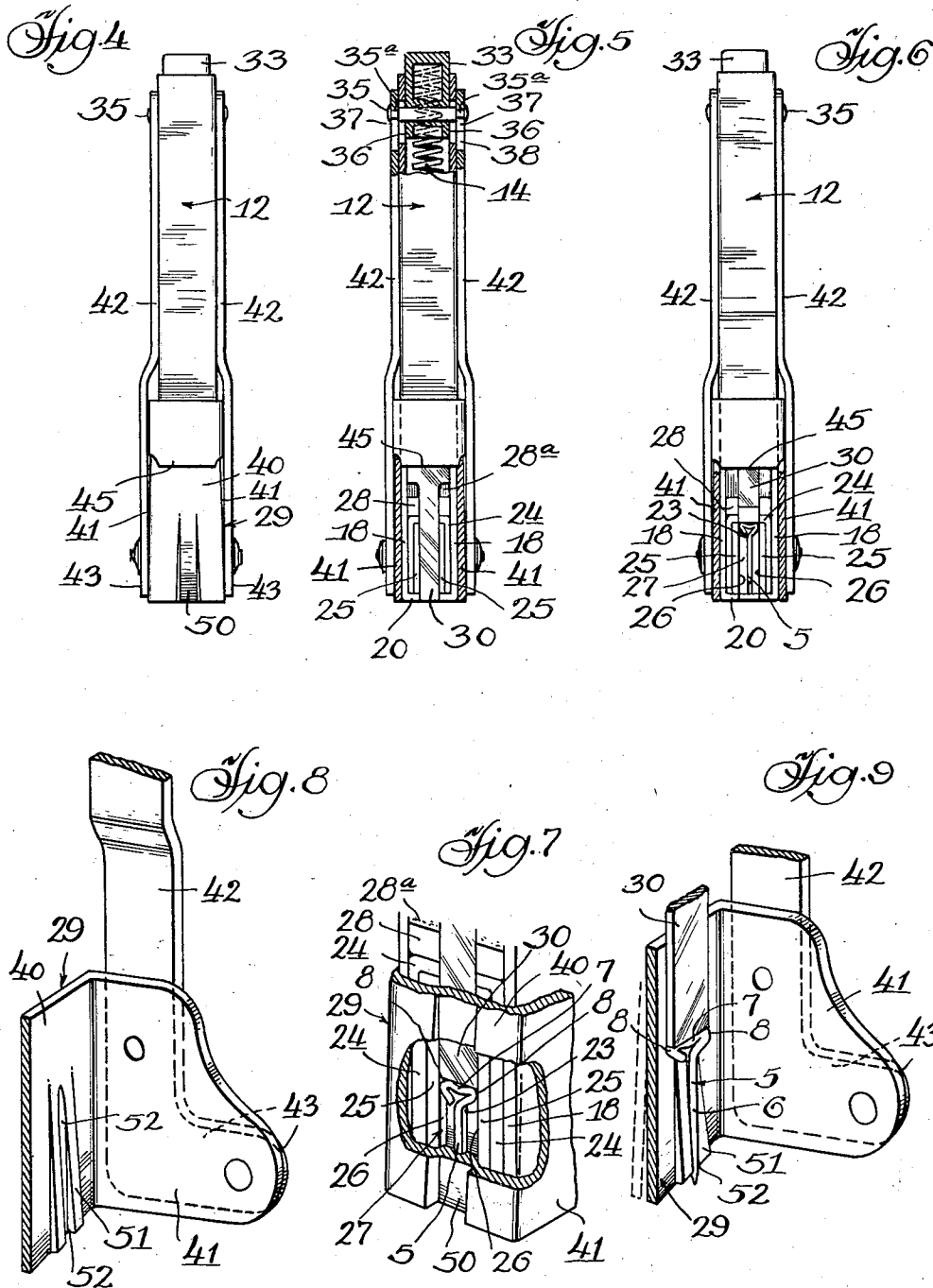
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PIN DRIVING MACHINE

Filed March 15, 1940

3 Sheets-Sheet 2



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PIN DRIVING MACHINE
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3 Sheets-Sheet 3

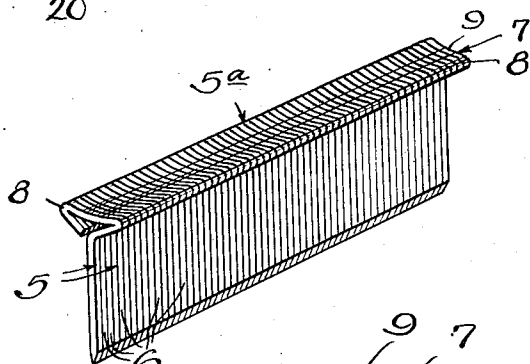
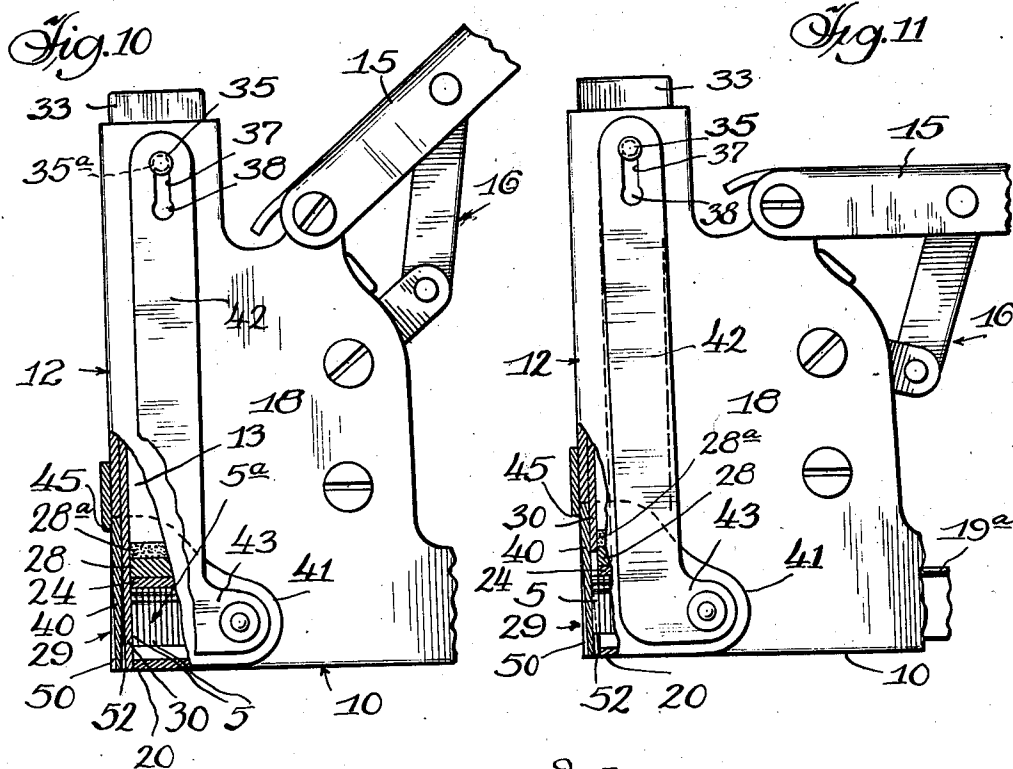


Fig. 14

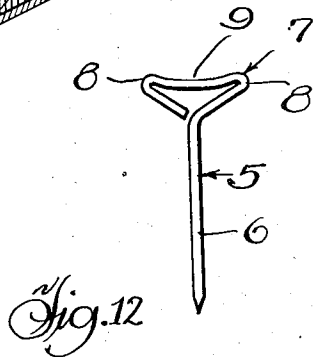


Fig. 13

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UNITED STATES PATENT OFFICE

2,300,277

PIN DRIVING MACHINE

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Application March 15, 1940, Serial No. 324,037

10 Claims. (Cl. 1—46)

This invention relates to improvements in manually operable tack-driving machines, and single shanked tacks or pins for use with such machines.

Among the objects of the invention is to provide a simple, inexpensive form of pin or tack having a single shank and a novel form of collapsible head, especially adapted for use with a pin-driving machine, and also to provide an improved, simple and efficient machine of the magazine type for driving such pins. Other objects of the invention will appear from time to time as the following description proceeds.

So-called "tacking machines" have heretofore been widely used commercially for driving staples, that is to say, U-shaped wire fasteners having two spaced legs. Strictly speaking, the term "tacking" is somewhat of a misnomer as applied to such machines, which, of course, are used solely for driving staples. In spite of certain advantages that seem to recommend the use of pins or tacks instead of staples, no one has heretofore produced, so far as I am aware, a satisfactory manually operable pin- or tack-driving machine. The principal difficulty seems to be that of insuring the proper feeding or ejection of single-shanked pins, and particularly ordinary flat-headed tacks or pins, so as to avoid clogging of the machine.

In carrying out my invention, I utilize a novel form of pin or tack made of a single length of wire, initially bent at its head end to form a partially open, triangular shaped "eye" with laterally extending wings, especially designed to cooperate with guiding means during the operation of the machine, but which "eye" when finally applied as a fastener tends to be collapsed upon itself to form a substantially T-shaped head, as will hereinafter more fully appear. Moreover, I find that new and peculiar advantages are derived by adopting in my novel form of pin-driving machine, certain features broadly disclosed in my co-pending application covering a staple-driving machine filed March 14, 1938, and bearing Serial No. 195,802, and in particular, as will hereinafter more fully appear, I utilize a movable jaw member as part of a novel form of pin-guiding driveway, which jaw member is operatively connected to the main driving springs of the machine so as to be yieldingly urged toward the driveway in timed relation with the action of said driving springs.

The invention may best be understood by reference to the accompanying drawings, in which

Fig. 1 is a perspective view of a tacking machine embodying a part of my invention.

Fig. 2 is a bottom view of the machine shown in Fig. 1.

Fig. 3 is an enlarged side view of the machine shown in Fig. 1, with parts broken away to show the construction of the head and drive springs and showing the operating mechanism in normal position.

Fig. 4 is a front view of the machine, showing the front jaw member in closed position.

Fig. 5 is a view similar to Fig. 4, but showing the front jaw broken away, and the driving blade in lowered position to close the end of the pin magazine. This view also shows details of construction of the head.

Fig. 6 is a view similar to Fig. 5, but showing the driving blade in raised position, and with a pin in driving position in the driveway.

Fig. 7 is an enlarged fragmentary perspective view showing a portion of the front jaw broken away, and with the driving blade and pin in substantially the same positions indicated in Fig. 6.

Fig. 8 is an enlarged fragmentary perspective view showing the guiding means on the inner surface of the jaw member.

Fig. 9 is a view similar to Fig. 8, but also showing the driving blade in driving engagement with a pin.

Figs. 10 and 11 are fragmentary side views of the machine with parts adjacent the driveway broken away to show the relative positions of the parts, and particularly the front jaw member, when the driving blade is in lowered position in Fig. 10, and in raised position in Fig. 11.

Fig. 12 is a greatly enlarged view of the pin or tack especially designed for use with the tacking machine.

Fig. 13 is a view showing the pin after it has been applied as a fastening device, and illustrating by comparison with Fig. 12 the relative flattening of the head usually resulting from the action of the driving blade.

Fig. 14 is a perspective view of a strip or gang of pins, secured together by adhesive in convenient form for application to the magazine of the machine.

Referring first to the novel form of pin or tack, which constitutes a departure from fastening devices heretofore employed in tacking machines, said pin is shown generally at 5 in Fig. 12, and comprises a shank 6 and a head 7 made by bending a single length of wire upon itself into a generally triangular shape including laterally ex-

tending wings 8, 8, as shown. The head with its wings form a relatively flat, partially open triangular "eye." The upper cross member 9 forming the inverted base of the triangular eye is slightly concaved or dished downwardly at the center, this configuration of the head being one that has been found especially suited for manufacture by a simple forming operation, and affording certain advantages in the operation of the machine, as will presently appear.

A large number of the pins or tacks are preferably secured in flatwise relation to each other by a suitable adhesive, in much the same manner that staple fasteners have heretofore been treated, to form a strip or gang 5^a as shown in Fig. 14, for convenience in handling and for insertion in the magazine of the machine.

Referring now to details of the tacking machine illustrated in the drawings, the general features are similar to those previously employed in staple-driving machines. In fact, excepting for the shape of the pin magazine and important additions to the guiding means associated with the pin driveway, the machine herein shown is substantially the same as the staple-driving machine disclosed in my co-pending application, Serial No. 195,802, hereinbefore referred to. Said machine includes a base 10, handle 11, and a hollow head 12 at the driving end of the base, which head houses a driving plunger 13 and springs 14, 14 for driving it. An operating lever 15 is arranged to be gripped by the palm of the hand with the fingers engaged below the handle when operating the plunger to drive a pin, said operating lever being connected to a pawl 17 by a spring-controlled linkage of the usual type indicated generally at 16. 18, 18 indicate spaced upright wings extending upwardly from the base 10 and rearwardly from the head 12, which wings provide support for the lever 15, the linkage 16, pawl 17, and an arbor on which is mounted a coil spring 19 which acts on a follower plate 19^a in the usual manner to feed the pins along the magazine 23 in the base 10.

The magazine 23 for the pins is herein made up of an inverted U-shaped channel strip 24 fitting between the side wings 18, 18 and extending rearwardly along the base 10, and two upright strips 25, 25 mounted in the channel 24 and spaced apart from each other, as shown in Fig. 6, to form a way along which the pins 5 are fed to the vertical driveway 27. In the form shown, the rear side walls of said driveway are formed by opposed cut-away shoulders 26, 26 in the front ends of the upright strips 25, 25, and by notched portions of channel strip 24 and bottom plate 20. The front wall of said driveway is formed by a movable jaw member 29, which will hereinafter be more fully described. A driving blade 30 depends from the driving plunger 13 and operates through said vertical driveway 27.

An anvil plate 28, together with a superimposed pad 23^a of suitable resilient material, are mounted as usual at the front end of the base immediately above the channel strip 24 in position to receive the blow of the plunger 13 when it reaches the end of its downward movement.

The hollow head 12 is open at the top end which is enclosed by a cap 33, herein telescoped therein. The two drive springs 14, 14 in the head 12 are interposed between the driving plunger 13 and cap 33 so that said cap forms in effect a reaction member for said drive springs.

Means are provided for affording limited ver-

tical movement of cap 33 relative to said head, as herein shown, such means consisting of a transverse pin 35 extending through the walls of said cap and between the springs 14, 14, and having limited vertical movement in slots 36, 36 formed in the side walls of the head 12, as shown in Fig. 5. The ends of pin 35 have reduced portions 35^a, 35^a which fit in slots 37, 37 formed in connecting links 42, 42 at opposite sides of the head. Said slots are enlarged at their lower ends, as indicated at 38 (see Fig. 10) to permit endwise removal of the pin 35 when desired.

The front jaw member 29 comprises a front wall 40 having flanged side cheeks 41, 41 overlapping the side wings 18, 18 adjacent the base 10 of the machine, and with its bottom edge normally flush with the bottom surface of the said base. The links 42, 42, which are pivotally connected to pin 35 carried by cap 33 as previously described, normally depend vertically along opposite sides of the head and have L-shaped rearwardly extending portions 43, 43 at their lower ends pivotally connected to the rear ends of the cheeks 41, 41 of said jaw.

A catch or locking projection 45 is mounted on the front face of the head 12 in position to be engaged by the upper edge of the jaw 29.

It will be understood that the driving springs 14, 14 are normally placed under comparatively light compression when the jaw member 29 is engaged beneath the catch 45. Accordingly, said jaw is normally urged toward the front of base 10 to enclose the front of the driveway 27 under a relatively slight yielding tension imposed thereon by the springs 14, 14, acting through cap 33 and links 42, 42 in a rearwardly inclined plane passing through the rearwardly offset points of pivotal connection at the bottom of said links, while the catch 45 forms in effect a fulcrum about which said jaw is rockable. The arrangement is such, however, that when the operating lever 15 is depressed to raise the plunger 13, as for instance on driving a pin, the springs 14, 14 are placed under increased compression. The cap 33 therefore forms a movable reaction member for the springs, and the resulting increased spring tension is transmitted through links 42, 42 to the jaw 29 so as to urge the latter toward the base 10 under correspondingly increased tension. Conversely, when the compression on the drive springs 14, 14 is released, as when the pawl 17 releases the plunger 13 for its downward, driving movement, the pressure on the jaw 29 is correspondingly decreased.

Referring now more particularly to the features of the machine which are especially adapted for driving the novel form of pin 5, reference may be had to Figs. 4 to 11, both inclusive, showing details of the driveway 27 and the jaw 29 which cooperate to provide novel guiding means for said pins during the driving operation.

The front wall 40 of the jaw 29 has a centrally disposed, inwardly offset portion 50, which on the inner face of said wall forms a cam member 51. Said cam is of substantially the same width as the driveway 27 and gradually increasing in thickness from a point opposite the top of the magazine way 23 until at its lower end it is substantially as deep as said driveway. The arrangement is such that when the driving blade 30 is in raised position, as shown in Fig. 11, inward spring tension on jaw 29 is sufficient to move the cam surface 51 into the lower end of the driveway 27 and substantially close the latter at the bottom thereof. When the blade

30 is lowered, however, it moves the jaw outwardly and away from the driveway 27 against said spring tension to make way for said blade, as indicated in Fig. 10.

An upright groove or slot 52 is formed vertically along the center of the cam surface 51. The bottom of said groove is preferably arranged substantially in the same plane as the inner surface of the front wall 40, as is perhaps best seen in Figs. 8 and 9. Due to the inclination of cam 51, the bottom of said groove 52 gradually becomes shallower toward its upper end. Said groove is throughout of proper width, and at its lower or discharge end is of proper depth, to accommodate the shank 6 of a pin 5, so as to form a closely restricted guide for said shank. It will especially be noted that since the driving blade is raised just before it is released for driving action, the lower end of driveway 27 is entirely closed by cam 51 excepting for the groove 52. Said groove therefore provides the sole outlet for the point of the pin and a guide for the pin shank during its initial downward movement along the driveway.

The head 7 of the pin is fed laterally from the magazine 23 into the driveway 27, the side walls 26, 26 of which are of proper width to receive wings 8, 8 of said head in lateral guiding relation, as indicated in Figs. 6 and 7. The head 7 is fed into the driveway at a point above the cam 51, so that said head moves freely into said driveway, even though at that instant said cam closes the lower end of the driveway excepting for the groove 52 therein.

When the plunger 13 is released by the pawl 17, the blade 30 engages the head 7 and drives the pin downwardly. During this initial downward movement of said head, it will be observed that the wings 8, 8 immediately pass downwardly out of registering position with the upper triangular portion of the magazine 23 and into vertical guiding relation between the adjacent front faces of the plates 25, 25 and the opposed wall 40 of the jaw 29. Thus the open triangular portion of the head 7, and particularly the wing portions 8, 8 thereof, coact with the front, rear and side walls of the driveway to keep the pin in proper vertical alignment during its downward movement, and particularly to keep the point of the pin from swinging inwardly toward the base of the machine and fouling on the bottom of the magazine or on the base plate. The wings 8, 8 continue their guiding action, however, throughout the entire downward movement of the driving blade, since they are engaged flatwise against the cam 51 under constant guiding tension while the jaw is being gradually forced outwardly by the action of the driving blade.

The especial advantages of the variable tensioning of the jaw member 29 in timed relation to the action of the driving springs and the blade, when applied to the head-and-shank-guiding means above described, will now be apparent. The inward pressure on the jaw member is automatically increased as the blade is raised and each successive pin is fed from the magazine into the driveway 27. The increased pressure on said jaw serves to force the lower end of cam 51 into the driveway and close the lower end of the latter excepting for the groove 52, at precisely the proper time, namely, when the pin point is moved into said groove ready for its initial downward movement. The jaw is yieldably urged inwardly, but under a diminishing pressure, while the blade is driving the pin downwardly. Thus, the blade

can readily force the cam out of the driveway to make way for the pin head as the latter is finally ejected from the driveway. Although release of pressure on the jaw during the driving action of the blade and plunger takes place almost instantaneously, the variable yielding action of the jaw occurs in the proper timed relation desired for the initial guiding action of the groove 52 on the point and shank of the pin, and for the subsequent guiding action of the cam surface 51 on the head of said pin.

It will be observed further that provision of the novel devices for guiding the pin disclosed herein do not detract from other advantageous features of the variable-tensioned jaw 29. For instance, even when maximum inward pressure is exerted on said jaw during the driving action of the machine, yet said jaw is still capable of outward yielding movement by further compression of the driving springs, in case the driveway should become clogged. Sufficient yieldability is thus afforded to permit the blade to reciprocate even though the driveway may become seriously clogged or jammed by one or more mutilated pins or tacks. Therefore, the blade can usually clear the machine by one or more succeeding strokes. It will also be seen that the jaw member 29 can be removed instantaneously, without the aid of tools, simply by exerting sufficient downward pressure on the cap 33 to move the upper edge of the jaw out of engagement with the catch 45. Said jaw is then free to be swung on its links 42 away from the base of the machine so as to expose all the parts associated with the driveway 27. The jaw member can be re-engaged in normal position beneath catch 45 by exerting sufficient pressure on cap 33.

The collapsible feature of the pin head may be best illustrated by reference to Figs. 12 and 13, which show, in an enlarged scale, a pin before and after it has been driven in the customary manner, as for instance, in tacking a card 55 or the like to a suitable base such as a board 56. When the pin meets the usual resistance of the material into which it is driven, the end of the blade 30 tends to close or collapse the triangular "eye" and flatten the angle of the wings 8, 8, particularly when the bottom of said wings finally engage a relatively stiff material, as for instance the card 55, as shown in Fig. 13. The slight initial concavity of the cross member 9 facilitates this flattening action. Accordingly, when the head 7 is finally driven home against the surface of said card, the entire head tends to be collapsed upon itself to form a substantially flat T-shaped securing member, as illustrated in Fig. 13. The amount of flattening may vary, however, depending partially upon the driving impact exerted by the blade, and partially upon the amount of resistance afforded by the material being acted upon. In practice I find that this flattening action is effective under practically all conditions where it may be desired. Under certain other conditions, however, as for instance where a relatively yielding material such as a cloth fabric is acted upon, the collapsing action will be correspondingly less effective. It will be understood that with fabrics or other soft materials, however, a complete collapsing action is usually unnecessary, and often actually undesirable because some softer materials might be injured thereby. Thus the novel form of pin head herein disclosed has the peculiar faculty of adapting itself more or less automatically to the kind of material to which it is applied. When

used on relatively hard surfaces the head can be finally flattened thereagainst in a T-shape having a minimum vertical thickness, whereas with softer material, more susceptible of injury, the head will have more or less of a tendency to sink therein, resulting in only a partial collapsing action, or perhaps none at all.

Pins 5 of varying lengths can be used in the same machine without requiring any adjustment of the latter.

Among the advantages of my novel form of pin-driving machine as compared to a staple-driving machine of the kind now so commonly used, are the much greater number of uses to which a pin or tack fastening device can be applied and adapted, and the fact that the machine itself can be made much lighter and will operate much easier than staple-driving machines of comparable effectiveness. A single-shank pin requires only about one-half the power that is needed to drive a double-shank staple of the same size. In practice this means that the driving springs need only have a fraction of the strength heretofore employed in staple-driving machines, and that the machine requires correspondingly less manual power for its operation.

As a further advantage of pins over staples, I find that the former are not as susceptible to accidental distortion after they are manufactured in the form of strips or gangs, and before they are finally inserted in the magazine of the machine. A source of trouble frequently encountered with staples is that of accidental pinching of the legs, particularly while they are being inserted in the magazine. Even a slight permanent distortion of staple legs unobservable to the eye, is frequently enough to cause clogging of the machine and in such cases it is most difficult to locate the real source of trouble. With single-shank pins the danger of such pinching is of course eliminated.

Although I have shown and described one specific form of my invention, it will be understood that I do not wish to be limited to the exact construction shown and described, but that various changes and modifications may be made without departing from the spirit and scope of my invention as defined in the appended claims.

I claim as my invention:

1. In a pin-driving machine, a frame having a driveway, a yieldable wall portion adapted to fit into said driveway adjacent its lower end at an inward and downwardly inclined direction to form a relatively wide lateral guiding surface for the head of a pin, said wall portion also having a restricted groove therein disposed at a continuous outwardly flaring angle to said guiding surface to receive the shank of a pin in guiding relation when said pin is in initial driving position in said driveway, and a drive member operating in said driveway and cooperating with said wall portion to move the latter into vertical alignment with said driveway while the pin head is being ejected from said driveway.

2. In a pin-driving machine, a frame having a driveway, a yieldable wall portion adapted to fit into said driveway adjacent its lower end at an inward and downwardly inclined direction to form a relatively wide lateral guiding surface for the head of a pin, said wall portion also having a restricted groove therein disposed at a continuous outwardly flaring angle to said guiding surface to receive the shank of a pin in guiding relation when said pin is in initial driving position in said driveway, and a drive member

operating in said driveway and cooperating with said wall portion to displace the latter from within said driveway but maintained in alignment with the latter under yielding lateral engagement with said pin head while the pin is being ejected from said guideway.

3. In a pin-driving machine, a frame having a pin driveway, a drive member reciprocable in said driveway, spring means for actuating said drive member, a movable reaction member for said spring means, a movable jaw member including a wall portion having an upright groove therein adapted to extend laterally into said driveway, and means operatively connecting said reaction member to said jaw member to urge the latter toward said driveway under compression of said spring means.

4. In a pin-driving machine, a frame having a pin driveway, a drive member reciprocating in said driveway for actuating said drive member, a movable jaw member including a vertically grooved wall member displaceably fitting in the path of movement of said drive member at the lower end of said driveway, and linkage means yieldingly actuated by compression of said spring means tending to urge said wall member into the path of said drive member under pressure substantially proportional to the degree of compression of said spring means.

5. In a pin-driving machine, a frame having a pin driveway at the bottom thereof, a laterally disposed pin magazine having means for feeding headed pins successively into driving alignment in said driveway, a pin-driving member reciprocable in said driveway, a movable wall portion displaceably fitting in the path of movement of said drive member opposite the feeding end of said pin magazine to form a guide for the head of a pin, and said wall portion having a vertically disposed groove disposed at a continuous outwardly flaring angle thereto, to receive the shank of a pin when the latter is initially fed into said driveway, said pin driving member cooperating with said wall to move the latter into and out of pin guiding alignment with said driveway in timed relation with the reciprocation of said pin driving member.

6. In a pin-driving machine, a frame having a pin driveway at the bottom thereof, a laterally disposed pin magazine having means for feeding headed pin successively into driving alignment in said driveway, a pin-driving member reciprocable in said driveway, spring means for actuating said drive member, a movable jaw member including a wall portion displaceably fitting in the path of movement of said drive member opposite the feeding end of said pin magazine to form a guide for the head of a pin, said wall portion also having a vertically disposed groove to receive the shank of a pin when the latter is initially fed into said driveway, and linkage means yieldingly actuated by compression of said spring means tending to urge said wall portion into the path of movement of said drive member and toward said pin magazine.

7. In a pin-driving machine, a frame having a pin driveway, a drive member reciprocable in said driveway, spring means for actuating said drive member, a movable reaction member for said spring means, a movable jaw member including a wall portion adapted to form a relatively wide lateral guiding surface for the head of a pin, said wall portion also having an upright groove therein to receive the shank of a

pin, means operatively connecting said reaction member to said jaw member to urge the latter towards said driveway under compression of said spring means, with said wall portion inclined downwardly and inwardly in said driveway, but said drive member cooperating with said wall portion to move the latter into vertical alignment with said driveway while the pin head is being ejected from said driveway.

8. In a pin-driving machine, a frame having a pin driveway at the bottom thereof, a laterally disposed pin magazine having means for feeding headed pins successively into driving alignment in said driveway, a pin driving member reciprocable in said driveway, spring means for actuating said drive member, a movable jaw member including a wall portion displaceably fitting in the path of movement of said drive member opposite the feeding end of said pin magazine to form a guide for the head of a pin, said wall portion also having a vertically disposed groove to receive the shank of a pin when the latter is initially fed into said driveway, and linkage means yieldingly actuated by compression of said spring means tending to urge said wall portion into the path of movement of said drive member, but said drive member cooperating with said wall portion to move the latter into vertical alignment with said driveway while the pin head is being ejected from said driveway.

9. In a pin-driving machine, a frame having a pin driveway, a drive member reciprocable in

said driveway, spring means for actuating said drive member, a movable reaction member for said spring means, a movable jaw member including a wall portion having an upright groove therein disposed at a continuous outwardly flaring angle to said wall portion and adapted to extend laterally into said driveway, and means operatively connecting said reaction member to said jaw member to urge the latter toward said driveway under compression of said spring means.

10. In a pin-driving machine, a frame having a pin driveway at the bottom thereof, a laterally disposed pin magazine having means for feeding headed pins successively into driving alignment in said driveway, a pin-driving member reciprocable in said driveway, spring means for actuating said drive member, a movable jaw member including a wall portion displaceably fitting in the path of movement of said drive member opposite the feeding end of said pin magazine to form a guide for the head of a pin, said wall portion also having a vertically disposed groove disposed at a continuous outwardly flaring angle to said wall portion to receive the shank of a pin when the latter is initially fed into said driveway, and linkage means yieldingly actuated by compression of said spring means tending to urge said wall portion into the path of movement of said drive member and toward said pin magazine.

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