Sept. 19, 1950 E. D. CHISAM 2,522,992

PIN-SETTING MACHINE

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Fig. 1.

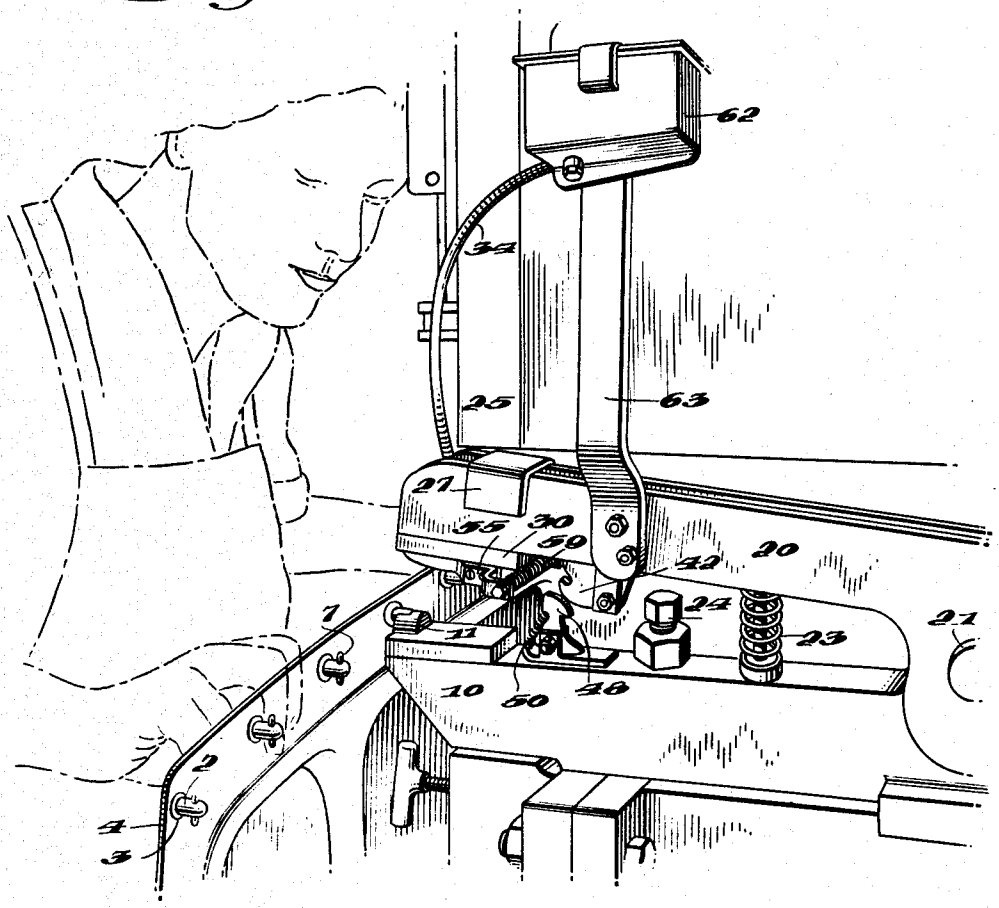


Fig. 14.

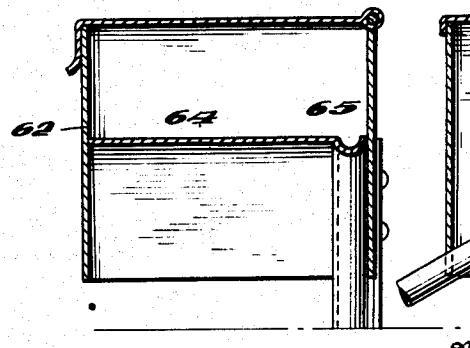
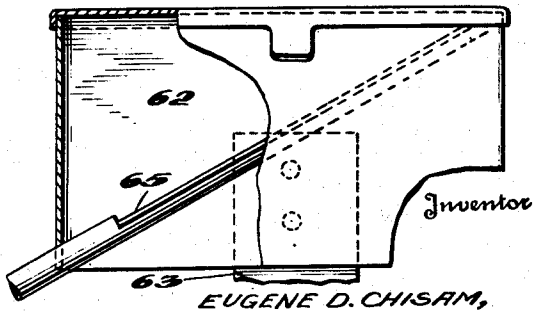


Fig. 13.



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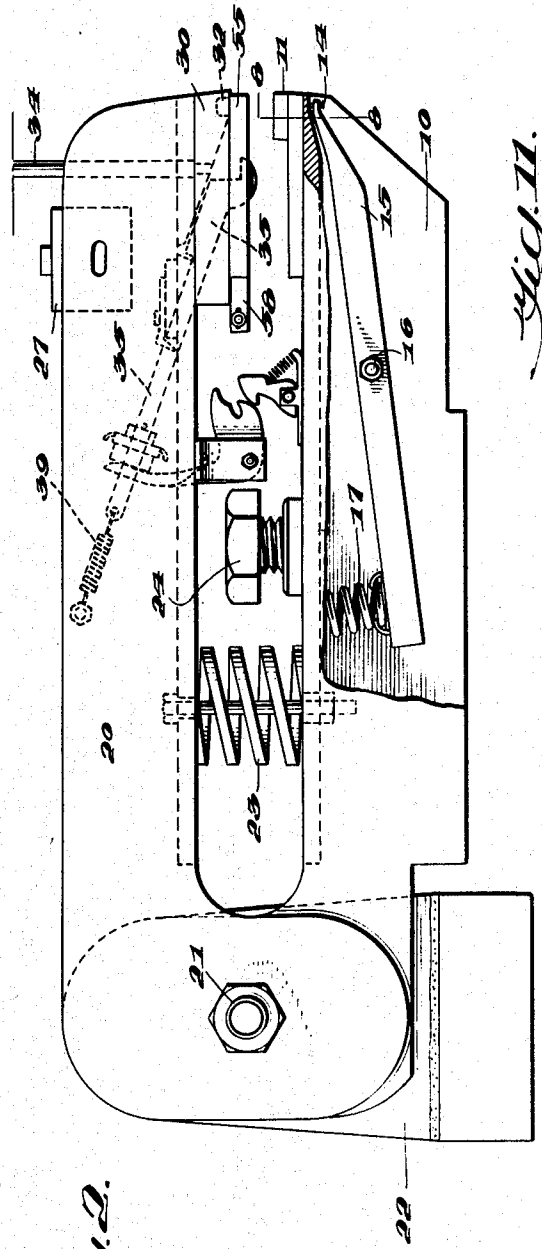


Fig. 2.

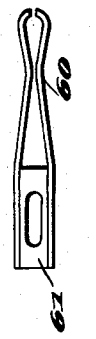


Fig. 11.

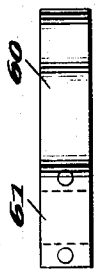


Fig. 12.

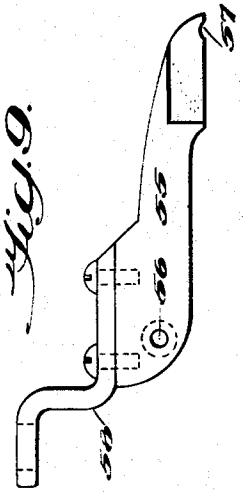


Fig. 9.

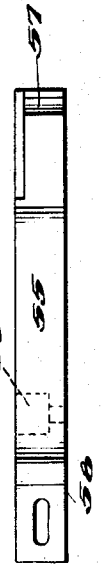


Fig. 10.

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Fig. 3.

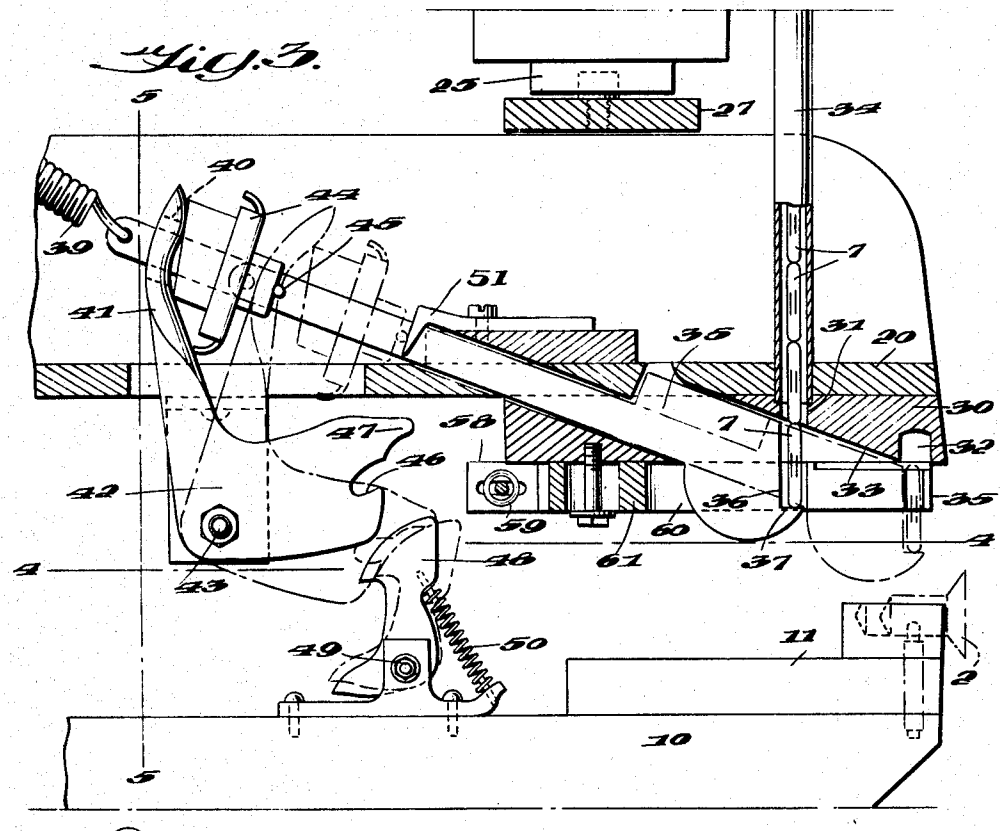
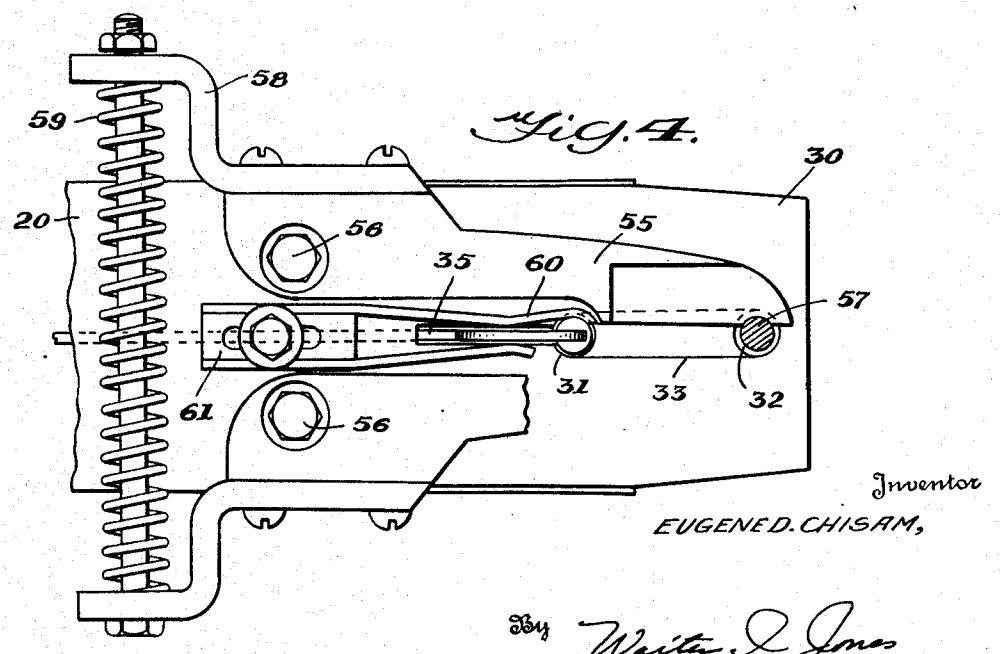


Fig. 4.



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Fig. 5.

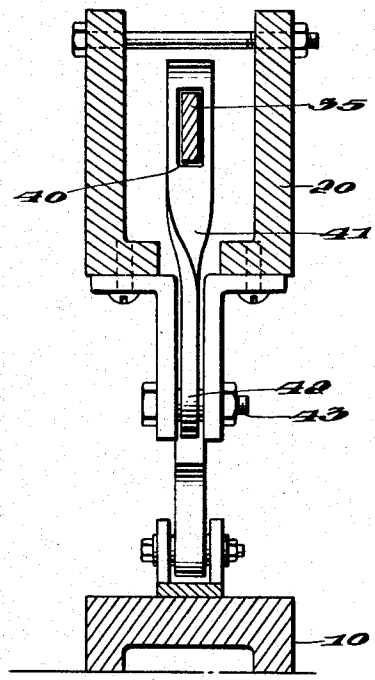


Fig. 6.

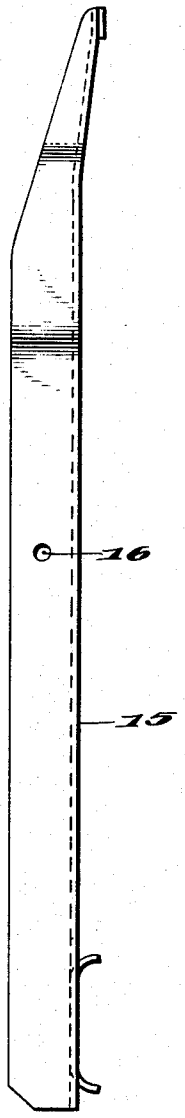


Fig. 7.

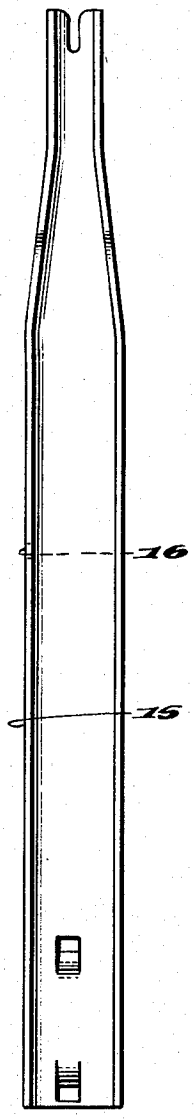


Fig. 8.

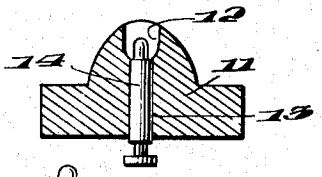


Fig. 15.

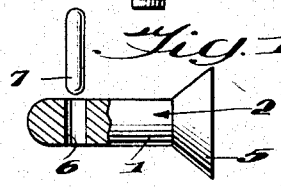
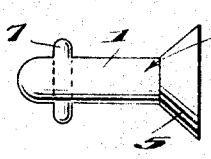


Fig. 16.



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UNITED STATES PATENT OFFICE

2,522,992

PIN-SETTING MACHINE

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Application December 21, 1944, Serial No. 569,203

4 Claims. (Cl. 29—211)

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The present invention relates to pin-inserting machines and aims to provide a simple and efficient machine for that purpose.

One particular aim of the invention is the provision of a machine for inserting pins in studs of fastener members, such as studs for fasteners of the rotary operative type, for example cowling fasteners. Such fasteners comprise a stud member rotatably mounted in one of the parts to be supported and provided with a transverse pin presenting radial arms adapted to lockingly engage an apertured locking element of a cooperating fastener part mounted upon another part or support. Such stud members are usually formed with integral head and shank portions, the latter being apertured near its nose end for the reception of the transverse pin. The transverse pin is fitted in the stud shank with a pressed fit and must be centrally positioned in the stud to insure operability of the stud in the cooperating fastener part. One type of fastener employing such a stud is illustrated in the Bedford Patent No. 2,306,928, granted December 29, 1942.

The fasteners above referred to are used extensively in securing cover plates to various supports, and particularly in securing cowling sheets to aircraft structures. Such cowling sheets are usually fitted with a number of fastener studs which are preassembled with the sheet before the latter is secured in the assembled installation. The sheets are first apertured and the shanks of the headed studs are inserted in the aperture of the sheet after which the pins are inserted transversely through the stud shank. Heretofore, the insertion of these pins in the studs has been performed manually, usually with the aid of pliers or a like tool, and this manual operation has been slow, tedious and relatively expensive.

The present invention provides a machine for efficiently performing this pin-inserting or pin-setting operation to the end that the work may be done more quickly, efficiently and economically.

These and other objects of the invention will be apparent to persons skilled in the art to which the invention pertains, from a consideration of the accompanying drawings and annexed specification illustrating and describing one suitable embodiment.

In the drawings

Fig. 1 is a perspective view illustrating a preferred manner of using the pin-inserting machine to complete fastener studs assembled with an aircraft cowling or like sheet;

Fig. 2 is an enlarged side elevation of the work-

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holding and pin-inserting mechanism of the machine, parts of the work-holding mechanism being broken away better to illustrate the construction thereof;

Fig. 3 is an enlarged vertical central sectional view of the pin-setting mechanism;

Fig. 4 is a bottom plan view of the pin-feeding and setting mechanism as taken on the line 4—4 of Fig. 3 with a portion of the pin-holding mechanism broken awaya;

Fig. 5 is a vertical transverse sectional view as taken on the line 5—5 of Fig. 3;

Fig. 6 is a detail side elevation of a pilot bar of the workholder and positioner;

Fig. 7 is a bottom plan view thereof;

Fig. 8 is an enlarged detail transverse sectional view of the workholder and positioner as taken on the line 8—8 of Fig. 2;

Fig. 9 is a detail plan view of one bracket arm of a pin-holder;

Fig. 10 is an edge view thereof;

Fig. 11 is a detail plan of pin-retainer;

Fig. 12 is a side view thereof;

Fig. 13 is a longitudinal sectional view of the pin hopper;

Fig. 14 is a transverse sectional view thereof;

Fig. 15 is an elevation, partly in section, of a fastener stud and cross pin in disassembled position; and

Fig. 16 is an elevation of the assembled fastener stud and cross pin as produced by the machine of the present invention.

The particular embodiment of the invention which has been selected for illustration in the accompanying drawings comprises a workholder and positioner adapted to receive and properly position the part to receive the pin, in the present instance the stud shank, and pin-feeding and setting member adapted to position the pin in the aperture of the positioned member or stud shank and to set it therein under pressure. In the illustrated use of the invention the member fed to the work-holder to receive the pin may comprise the shank 1 of a fastener stud 2 which has been previously positioned in apertures 3 of a cowling or like sheet 4. The studs are headed on one end, as at 5, and the nose end may be formed with a transverse aperture 6 to receive a pin 7, fed and set in the aperture 6 by the machine of the present invention. This transverse pin 7 not only retains the stud assembled with the cowling sheet 4, but is adapted to cooperate with an apertured fastener part on a support for securing the cowling sheet to the support, as is well understood in the art and ex-

plained in the Bedford Patent No. 2,306,928 above referred to.

The workholder and positioner advantageously may comprise a support 10 which may be hollow and carries at one end a workholder having a recessed seat 12 to receive the shank 1 of the stud 2. The workholder 11 may be formed with a vertical aperture 13 in which is movably mounted a pilot pin 14 adapted to engage in the transverse aperture 6 of the stud, and accurately position the stud shank to receive the pin from the pin-setting mechanism. The pilot 14 is resiliently urged in advanced position by suitable means, as for example a rocker bar 15 fulcrumed at 16 to the support 10 and resiliently urged by spring 17 to project the pin 14 through the workholder 11. Thus it will be clear that the pilot pin, in its normal position, will engage in the stud aperture 6 and center the stud to receive the pin 7 from the pin-setting mechanism. As the pin 7 is forced through the stud shank by the pin-setting mechanism, it engages the pilot pin and forces it out of the stud aperture 6 against the tension of spring 17.

The pin-feeding and setting mechanism is advantageously mounted on a support 20 movable toward and from the workholder support 10. In the illustrated embodiment, one end of the support 20 may be pivoted as at 21 to the support 10 and to upstanding brackets 22, the supports 10 and 20 being normally urged to separated position by an intermediate spring 23 interposed between the supports between the fulcrumed and free ends thereof. An adjustable stop 24 may be mounted on the support 10 forwardly of the spring 23 to limit closing movement of the supports 10 and 11.

The supports 10 and 20 of the respective workholding mechanism and pin-feeding and setting mechanisms are, in the illustrated embodiment, in the form of normally separated jaws with the support 10 for the workholding mechanism fixed and with the other support relatively movable with respect to the fixed support. However, in other embodiments of the invention the other support 20 may be fixed with the support 10 movable relative thereto or both supports may be movable. These jaws may be moved to closed position by any suitable means, for example a pneumatic squeeze mechanism comprising a piston rod 25 of a pneumatic motor adapted to engage and bear against a saddle or wear plate 27 on the support 20. The pneumatic squeezer may be operated by any suitable means, for example a treadle-controlled valve mechanism (not shown) as will be well understood in the art.

The pin-feeding and setting mechanism associated with the movable support includes a setting head, a pin-holding and positioning means for holding the pin in operative position under the pressure or setting head, a magazine for feeding the pins in end-to-end relationship to a pin-receiving position laterally spaced from the head, and a pin-feeding mechanism for selectively and individually feeding pins from the pin-receiving position laterally to a pin-affixing position axially of the setting head.

In the illustrated embodiment of the invention the support 20 is provided with base block 30 which may be suitably attached to the under face of the support 20 and which is provided with a pin-receiving opening 31, a pin-setting head 32, and a pin-feeder guide opening 33. The pin-receiving opening 31 is rearwardly of the head 32 and communicates with a magazine 34, for example a tube of slightly larger diameter than the pins 7, so as to permit their free movement therein while being fed by gravity in end-to-end relation axially of the opening 31. A pin-feeding bar 35 is movable in the guide opening 33 in the block 30 from a pin-receiving position axially of the opening 31 laterally to a pin-affixing position axially of the head 32, and preferably this bar has a vertically disposed pin-pushing face 36 and a right angular horizontally disposed pin-supporting face 37, both of which are preferably oblique to the longitudinal axis of the bar 35. Preferably the feeder guide opening 33 is inclined downwardly toward the head, for example at an angle of 20° to the horizontal and is of slightly greater width than the pin. In this manner, the pin is prevented from tumbling from the horizontal supporting face 37 as it is pushed forwardly to the setting position under the head 32.

The pin-feeding bars 35 may be actuated to feed pins 7 successively from the magazine to the pin-setting position by any suitable mechanism and preferably this is effected as a result of the opening movements of the jaw. The bar 35 is normally urged in retracted position by spring 39 interposed between the end of the bar and the support 20.

In the illustrated embodiment the bar 35 is reciprocally mounted in the upper movable jaw or support 20, and the rear end thereof extends through an opening 40 in arm 41 of an actuator 42 pivoted at 43 to the support 20.

The actuator 42 may be in the form of a bell crank lever, one arm 41 of which embraces the bar 35 and is operatively connected thereto by means of compensating spacers and washers 44 surrounding the bar and interposed between the actuator arm 41 and a transverse pin 45 on the bar 35. The other arm of the bell crank actuator 42 may be shaped to provide a latch-receiving notch or recess 46 and latch-actuating cam 47 adapted respectively to receive and actuate a latch 48 pivotally mounted as at 49 upon the opposite support or jaw 20. The actuator is normally held in its upper or unlatched position, as illustrated in full line in Fig. 3, by reason of the spring 39 and the connection between the actuator arm 41 and the base 35.

In the upper or open position of the jaw or support 20 the pin-feeding bar 35 is in a retracted position with the pin-supporting face 37 below and in axial alignment with the feed opening 31 and the magazine 34. As the upper support 20 is moved toward the support 10 the latch 48 is engaged in the recess 46 of the actuator 42. During initial upward or opening movement of the support 20 the actuator 42 is held engaged by the latch which rocks the actuator about its pivot 43 to the dotted line position shown in Fig. 3, thus moving the bar toward the open ends of the jaws, thus moving a pin 7 from a position axially of the magazine to a position axially of the head 32. In this position the bar 35 and the actuator 42 have been moved to their furthermost positions, whereupon the cam surface 47 of the actuator 42 engages the latch 48 to disengage it from the actuator 42, permitting the bar 35 and actuator to be returned to their normal positions by spring 39. The latch 48 is normally maintained in position to engage the latch by a spring member 50. Forward movement of the bar 35 may be limited by means of a stop member 51 adjustably mounted on the

support 20 in a position to engage a part of the bar, for example the pin 45.

The actuation of the pin-feeding bar 35 on the upward or opening movement of the jaws 20, as above explained, positions a fresh pin in the pin-affixing position axially of the setting head. This freshly positioned pin is held in pin-affixing position, during retraction of the bar, by means of a holding mechanism mounted on the support 20.

The pin-holding means advantageously comprises a pair of fingers 55 (see Figs. 4, 10 and 11) hingedly mounted as at 56 to a part of the support 20, for example the block 30, and having pin-gripping recesses 57 at their forward ends in axial alignment with the setting head 32. The adjacent faces of the fingers are spaced apart sufficiently to permit movement of the bar 35 between them, but are spaced sufficiently close together so that they may slidingly engage opposite sides of the pin while it is being pushed from the pin-receiving position to the pin-affixing position, thereby preventing the pin from falling from the pin feeding bar 35. The fingers may have extensions 58 rearward of the pivots between which is mounted a compression spring 59 or like means for normally maintaining the recesses 57 in closed position under resilient tension. These fingers will engage a pin 7 advanced by the pin-feeding bar 35 and hold it in pin-setting position, axially of the head 32, until and during the succeeding closing movement of the jaw 20 toward the machine 10.

As the bar 35 is moved to its retracted or pin-receiving position (as illustrated in full lines in Fig. 3) a pin drops from the magazine 34 upon the pin-supporting face or shoulder 37 of the bar 35. This may be, in part, below the narrow guide 33 of the block 30, and to hold the lower end of the pin against dislodgment from the shoulder, retainer fingers 60 are provided. These fingers 60 may advantageously be in the form of resilient strips of spring metal, transversely spaced on opposite sides of the bar 35 and suitably secured to a mounting 61. The free ends of the fingers are preferably arcuate and disposed on opposite sides of the bar immediately forward of the pushing edge 36 of the bar.

The pins 7 are fed to the tubular magazine from a hopper 62 suitably supported on a standard 63 on the machine. Preferably the hopper 62 consists of a receptacle having an inclined bottom 64, one edge of which merges into a semi-circular inclined trough 65 leading to the magazine 34. The standard 63 supporting the hopper is advantageously supported by the movable jaw 20 so that the hopper is jarred or vibrated with each operation of the machine. The pins will thus align themselves axially in the trough and be fed axially in end-to-end relation in the magazine.

In operation the stud shanks are fed to the workholder in any suitable manner, as for example by successively positioning them manually in the workholder 11 while partially assembled in the cowling sheet, as illustrated in Fig. 1. The stud shanks are positioned in the workholder recess 12 with the pilot pin 14 engaging in the aperture 6 of the stud shank. This properly positions the stud with its aperture 6 to receive the pin 7 fed by the pin-setting mechanism.

A pin 7 is held by the pin-gripping jaws 55 at the pin-affixing position having been fed thereto during the previous upstroke of the jaw 20.

As pressure is applied to the ram 25 of the pneumatic squeezer to move the jaw 20 toward the workholder 11, the pin 7 supported in the pin-affixing position is pressed into the aligned opening 6 of the stud shank 1 by the presser head 32. The movement of the head 32 toward the workholder 11 is controlled by the adjustable stop 24 so as to position the pin 7 centrally of the stud shank, during which action the pilot pin 14 is pushed out of the aperture 6 against the tension of lever 15 and spring 16.

In the completely depressed or closed position of the upper or movable jaw 20 the notch 46 of actuator 42 has become engaged by latch 48. During upward or opening movement of the jaw 20 the latch 48 remains locked in notch 46 of lever 42, rocking lever 42 about its pivot 43 to cause it to be moved to the dotted line position shown in Fig. 3, and moving the pin-feeding bar 35 outwardly toward the head 32 to move or transfer a pin 7 from the pin-receiving position below the magazine 34 to the pin-affixing position under the head 32, when the pin is held by the opposed fingers 55 ready to be pressed into an aperture of a stud shank on the next succeeding pressing operation of the machine.

The invention provides a novel machine which will quickly and economically insert cross pins in fastener studs and the like while positioning them accurately therein so that equal lengths of the pin will project beyond opposite sides of the stud shank.

The invention is not to be restricted to the particular details of the mechanism shown and described as the scope of the invention is best defined by the appended claims.

I claim:

1. A pin-inserting machine for positioning an elongated pin in a transverse aperture of a shank comprising a fixed workholder provided with a recess for receiving and positioning a shank and a depressible pin in said recess for engagement in the transverse aperture of such a shank and aligning said aperture of said shank in a predetermined position, a pin presser member movable toward and away from said workholder, power means for moving said pin presser member relative to said workholder, opposed levers mounted on said presser member provided with opposed substantially parallel faces and opposed grooves in said faces adjacent one end providing a pin-affixing position in axial alignment with said depressible pin in said workholder, spring means for urging said faces toward each other, opposed spring fingers secured to said presser member at one end and having outwardly bowed portions at the opposite end adjacent the end of said opposed faces opposite said grooves providing a pin-receiving position, a slide mounted for movement between said bowed portions of said fingers and said opposed faces of said levers and provided with an end surface substantially parallel the axis of said depressible pin and a pin-supporting face substantially normal to said end surface, tubular means for feeding elongated pins in end-to-end relationship to said pin-receiving position, and means for reciprocably moving said slide upon the movement of said pin presser member from said workholder so that said end of said slide may be caused to move from said pin-receiving position to said pin-affixing position and back, whereby upon the movement of said pin presser member away from said workholder an elongated pin supported at said pin-receiving position by said pin-supporting face and said

bowed portions of said fingers is pushed by said end surface from said bowed portions in opposition to frictional pressure from said opposed lever faces to said pin-affixing position for engagement in said grooves whereupon said end surface returns to said pin-receiving position where another pin drops into position to be supported by said bowed portions and said pin-supporting face.

2. A pin-inserting machine for positioning an elongated pin in a transverse aperture of a shank comprising relative movable workholder and pin-presser members, power means for moving said workholder and pin-presser members relatively toward and away from each other, said workholder member having a workholder provided with a recess for receiving and positioning a shank and a depressible pin in said recess for engagement in the transverse aperture of such a shank and aligning said aperture of said shank in a predetermined position, a pair of opposed spring operated levers mounted on said pin-presser member, each of said levers having a face disposed in opposed substantially parallel relation to the corresponding face of the other lever, each of said faces having a groove at one end in opposition to the groove of the other face, said grooves providing a pin-affixing position in axial alignment with said depressible pin, opposed spring fingers with one end secured to said pin-presser member and having opposed outwardly bowed portions at the opposite end adjacent the end of said faces opposite said grooves providing a pin-receiving position with an axis substantially parallel the axis of said depressible pin, tubular means for feeding elongated pins in end-to-end relationship to said pin-receiving position, a pin-feed bar mounted for sliding movement along a path between the outwardly bowed portions of said fingers and the opposed faces of said levers, said bar having an end surface substantially parallel the axis of said depressible pin and a pin-supporting face substantially normal to said end surface, and means for reciprocably moving said bar upon the relative movement of said pin presser and workholder members away from each other for feeding a pin from said pin-receiving position to said pin-affixing position and returning said bar to its initial position.

3. A pin-inserting machine for positioning an elongated pin in a transverse aperture of a shank comprising relatively movable workholder and pin-presser members, power means for relatively moving said members toward and away from each other, said workholder member having a shank-receiving recess and a depressible pin in said recess for engagement in the transverse aperture of such a shank and aligning said aperture in a predetermined position, a pin-holding mechanism on said pin-presser member comprising opposed levers having opposed substantially parallel faces, each face provided with a groove disposed in opposition to the groove of the other face, said grooves providing a pin-affixing position for holding a pin axial alignment with said depressible pin, means for feeding elongated pins in end-to-end relationship to a pin-receiving position on said pin-presser member, a pin-feed bar provided with an end surface for engagement with a longitudinal side of a pin and a face normal to said surface for supporting an end of such a pin and adapted and arranged for engaging a pin at said pin-receiving position and feeding it to said pin-affixing position, and means for reciprocably moving said bar upon the relative movement of said workhold and pin-presser members from each other for feeding a pin from said pin-receiving position to said pin-affixing position and returning said bar to its initial position.

4. A pin-inserting machine for positioning an elongated pin in a transverse aperture of a shank comprising a fixed workholder provided with a recess for receiving and positioning a shank and a depressible pin in said recess for engagement in the transverse aperture of such a shank and aligning said aperture of said shank in a predetermined position, a pin-presser member movable toward and away from said workholder, power means for moving said pin-presser member relative to said workholder, opposed levers mounted on said presser member provided with opposed substantially parallel faces and opposed grooves in said faces adjacent one end providing a pin-affixing position in axial alignment with said depressible pin in said workholder, means for feeding elongated pins in end-to-end relationship to a pin-receiving position on said pin-presser member, a pin feed bar provided with an end surface for engagement with the longitudinal side of a pin and a face normal to said surface for supporting an end of such a pin and adapted and arranged for engaging a pin at said pin-receiving position and feeding it to said pin-affixing position, and means for reciprocably moving said bar upon the relative movement of said workholder and pin-presser members away from each other for feeding a pin from said pin-receiving position to said pin-affixing position and returning said bar to its initial position.

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