Aug. 14, 1956 J. M. SCHAEFER 2,758,322

EJECTING DEVICES FOR HEADERS OR LIKE MACHINES

Filed June 7, 1952 3 Sheets-Sheet 1

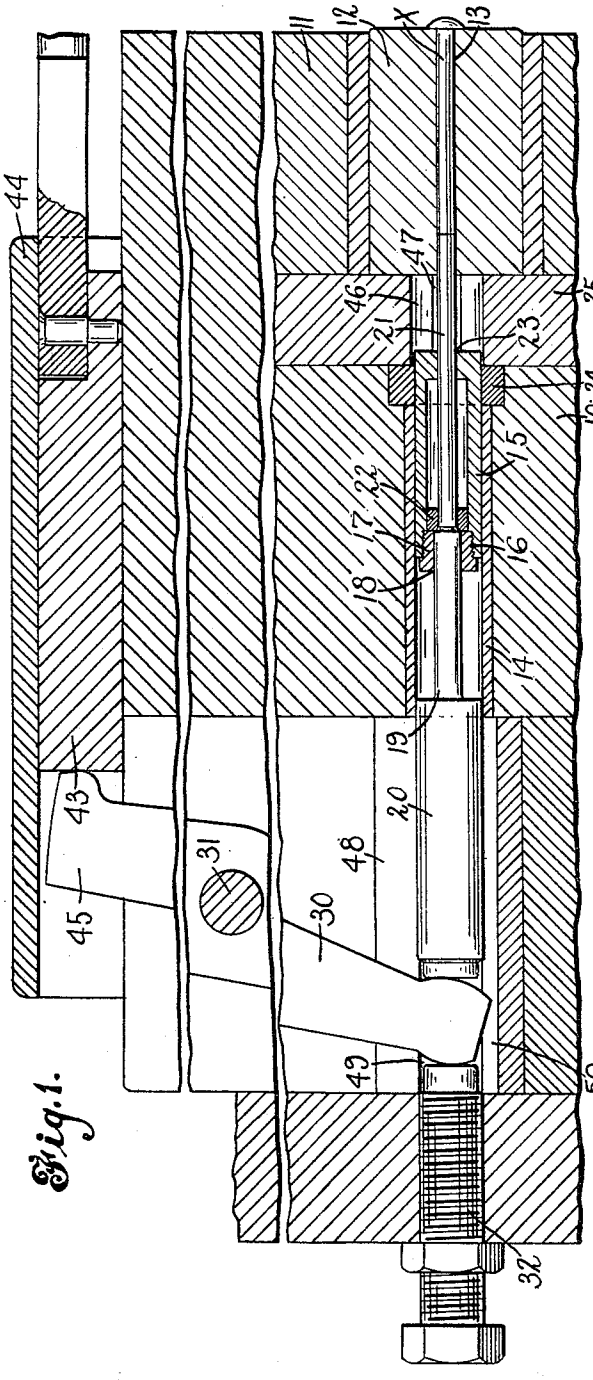


Fig. 1.

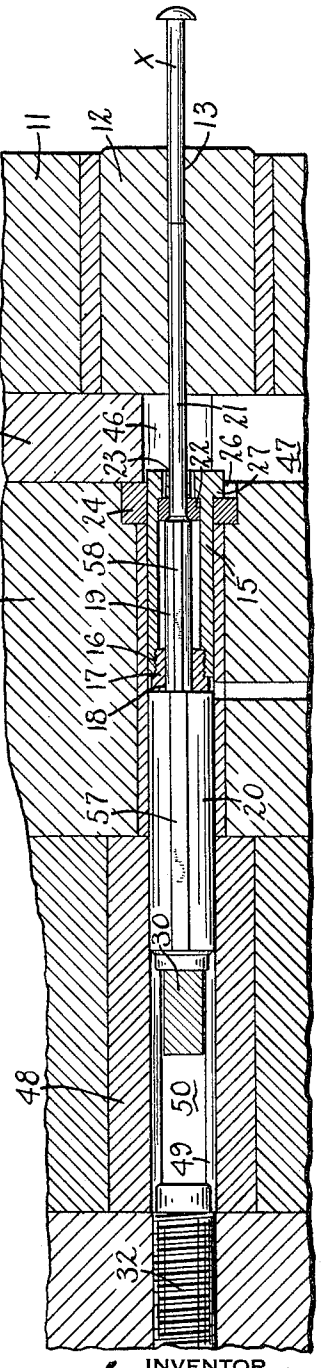


Fig. 2.

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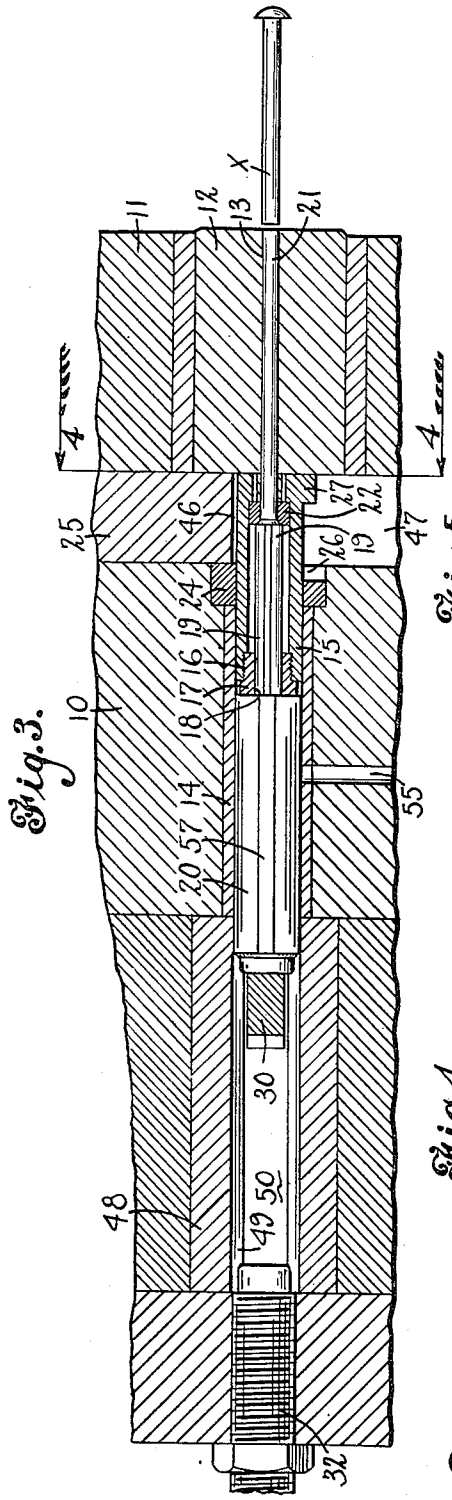


Fig. 3.

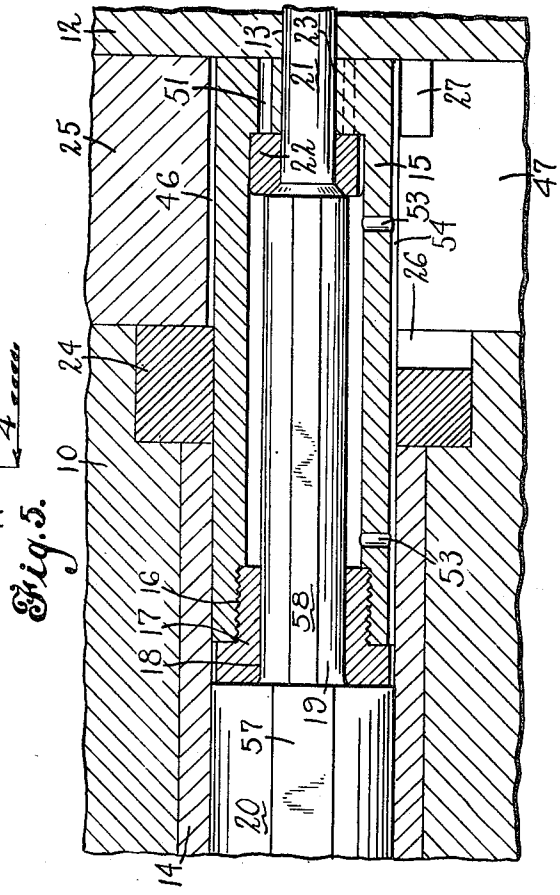


Fig. 5.

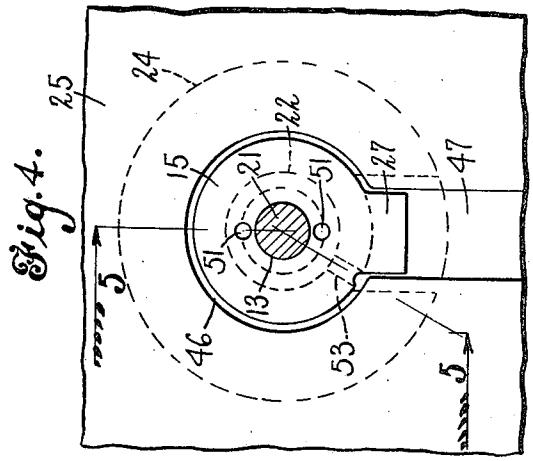


Fig. 4.

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3 Sheets-Sheet 3

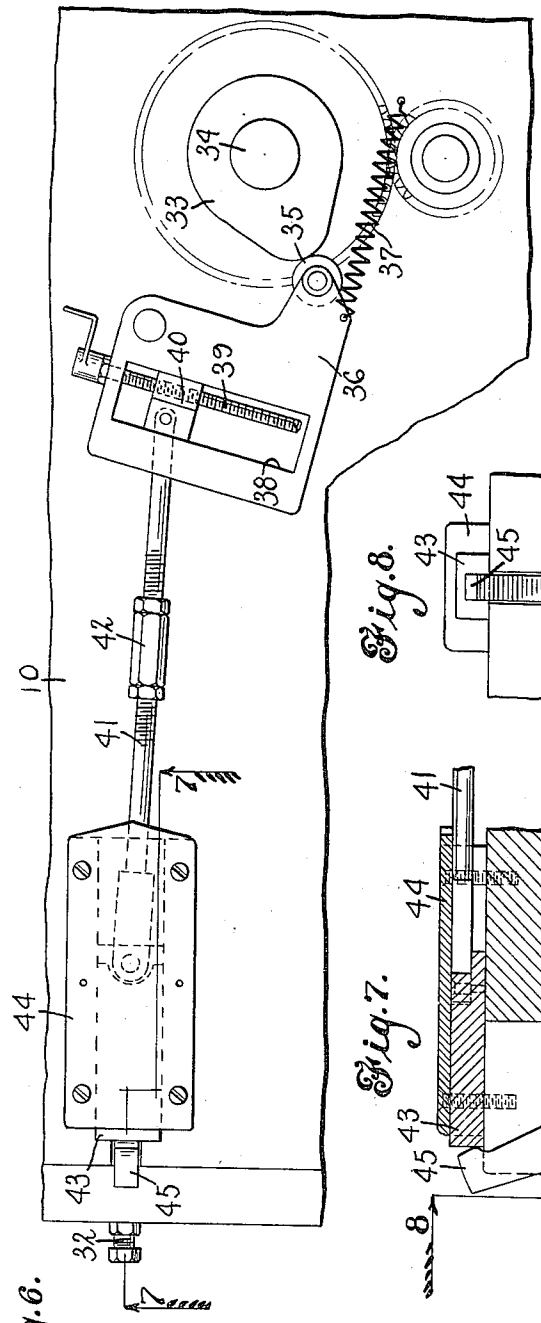


Fig. 6.

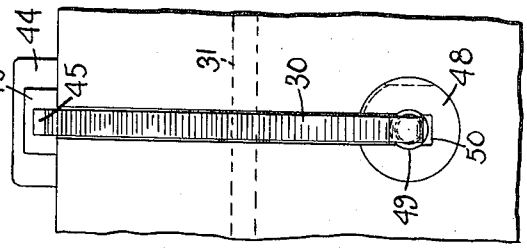


Fig. 8.

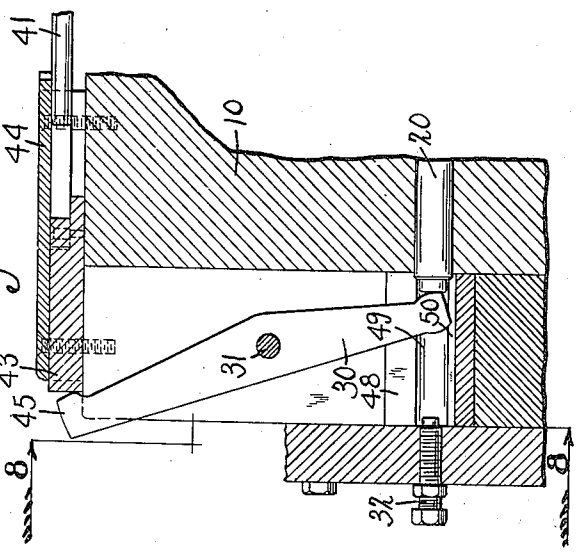


Fig. 7.

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EJECTING DEVICES FOR HEADERS OR LIKE MACHINES

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Application June 7, 1952, Serial No. 292,371

3 Claims. (Cl. 10—11)

This invention relates to ejecting means for headers or like devices and more particularly to an ejecting or knock out mechanism for ejecting a blank from a die after an operation has been performed upon the blank.

In such a device as a cold heading or like machine wherein the heading die is a cylindrical member with a hole through the center and a blank in the form of an elongated member such as a rod or wire is upset or headed in the die, there is usually provided a knock out pin which is actuated at the proper time to be thrust into the die and push the blank from the die. The blank is usually headed while bearing against the end of the knock out pin so that the latter must be considerably longer than the blank itself so that that part of the pin which projects back of the die will be at least equal to the length of the headed blank.

Ordinarily this part of the pin is not supported, and if this unsupported part of the pin which projects back of the die is no longer than approximately eight times its diameter, no particular difficulty is experienced in ejecting the blank. However, if this ratio of length to diameter is exceeded, the knock out pin will have a tendency to bend or buckle and sometimes break. This is particularly true when the header is operated at a high speed.

The present invention is designed to solve the problem referred to above and provide a construction wherein the knock out pin is so supported intermediate its length that buckling or bending of the pin will be prevented, and likewise no difficulty will be experienced in lubricating the parts and no trouble will occur due to the trapping of the lubricant.

As illustrated the knock out pin is slidably mounted in a sleeve member which sleeve member is in turn slidably mounted in a bushing fixed in the frame of the machine. The sleeve member is provided with an opening at its end for the knock out pin so that the latter will be supported at this point, the length of the sleeve being less than that of the pin. Therefore, the pin will be supported intermediate its length and means are provided to limit the movement of the sleeve in the bushing so that the sleeve will never be permitted to travel as far as the length of the stroke of the knock out pin. With this construction the latter will always be supported intermediate its length and no trouble will be experienced by reason of the bending or buckling of the pin even at high speeds.

Also the provision is made in the bushing as well as in the sleeve for the release of trapped oil or air so that there will be free operation of the parts even at high speed and any resistance to movement of the knock out pin due to such causes is diminuted.

One object of the present invention is to provide new and improved knock out or ejecting mechanism for a header or like machine.

A further object of the invention is to provide ejecting means for headers or like mechanism provided with an ejecting or knock out pin and with means for supporting this pin intermediate its length so that it will be prevented from bending or buckling in use.

A still further object of the invention is to provide an ejecting mechanism of the character described wherein the knock out pin is slidably mounted in a sleeve which provides positive lateral support for an intermediate part of the pin, and wherein this sleeve and the bushing within which the sleeve is slidably mounted are provided with ducts or passages permitting escape of trapped oil and air so as to eliminate resistance to operation of the ejecting mechanism particularly at high speeds.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a sectional view through the die of a heading machine illustrating one embodiment of my invention;

Fig. 2 is a vertical sectional view showing the knock out mechanism in another position in which the blank has been partially ejected from the die opening;

Fig. 3 is a view similar to Fig. 2 showing the position of the parts when the blank is completely ejected from the die opening;

Fig. 4 is a sectional view on line 4—4 of Fig. 3;

Fig. 5 is a sectional view on line 5—5 of Fig. 4;

Fig. 6 is a side elevational view of the mechanism for operating the knock out pin;

Fig. 7 is a sectional view on line 7—7 of Fig. 1; and

Fig. 8 is a view on line 8—8 of Fig. 7.

To illustrate a preferred embodiment of my invention I have shown in the drawings a portion of a header or like machine comprising a frame portion 10, a die block 11 in which is mounted a die 12 having the usual die opening 13 therein.

Mounted in the frame is a bushing 14 within the bore of which is slidably mounted a sleeve member 15. The rear end of this sleeve member is threaded at 16 to receive a hollow thimble 17 provided with a central bore or opening 18 through which is adapted to pass the forward reduced end 19 of the ejecting rod, the main portion of which is shown at 20.

The ejecting pin is shown at 21, which pin is provided with a head 22 slidably and snugly received within the bore of the sleeve 15. This pin 21 projects forwardly through the forward end of the sleeve, which end is provided with an opening 23 through which the pin is adapted to slide.

At the forward end of the bushing 14 is provided a plug 24 which plug extends to the forward end of the frame member 10 and rests against the die backing plate 25. This plug is provided with a recess 26 at its forward end, and the forward end or head of the sleeve 15 is provided with a lug or stop 27 adapted to enter this recess and abut against the forward face of the plug. This position of the parts is shown in Fig. 1, and it will be seen that the engagement of the lug 27 with the forward end of the plug limits the movement of the sleeve to the left or in a rearward direction away from the die. The movement of the sleeve in a forward direction is limited by engagement with the rear face of the die 12, as shown in Fig. 3.

In the position of the parts shown in Fig. 1 wherein the ejecting mechanism is in its rearward or most retracted position the portion 20 of the knock out rod lies against the end of a lever 30 pivoted to the frame at 31. An adjustable screw 32 is threaded into the frame to limit the movement of the lever 30 in a rearward direction so as to limit the rearward movement of the rod 20, and likewise rearward movement of the ejecting pin 21 for the movement of the ejecting pin is limited by the reduced end 19 of the rod.

The means for operating the lever 30 is shown more particularly in Figs. 6, 7 and 8. A cam 33 is secured upon a shaft 34, which shaft may be connected with the main shaft of the machine. A cam follower 35 is provided upon a slotted arm 36 and a spring 37 normally holds the cam follower against the surface of the cam 33. Mounted in the slot 38 of the arm 36 is a threaded screw 39, and on this screw is an adjustable block 40 to which is pivoted a rod 41, the effective length of which may be adjusted by the turn buckle 42.

The other end of the rod 41 is pivoted to a slide 43 which slide is held against the frame of the machine by a bracket 44 which is provided with a slideway for the member 43. The end of the slide bears against a nose portion 45 of the lever 30, and movement of the slide to the left, as shown in Fig. 6 and Fig. 7, by the cam 33 tends to rock the lever 30 in a counter-clockwise direction about its pivot 31 so as to drive the ejecting pin forwardly and eject the work from the die. The knock out rod 20 and pin 21 and associated parts are moved in the opposite direction when the work is pushed into the die by the heading tools.

The die backing plate 25 is provided with an opening 46 to receive the end of the sleeve 15, and a slot 47 shown more particularly in Fig. 4 leads into this opening so as to slidably receive the lug 27 so that the sleeve will be prevented from turning.

The enlarged portion 20 of the knock out rod moves within a sleeve 48 mounted in a bore in the frame. This sleeve has a keyhole-shaped opening 49 therein, shown more especially in Fig. 8, the round portion of which partially fits the part 20, and the slotted portion 50 of which receives the lever 30. It is noted that this slotted portion 50 extends slightly beyond the rounded portion so as to accommodate the extreme end of the lever in its reciprocating movements.

As shown more especially in Figs. 4 and 5, the end portion of the sleeve is provided with openings 51 upon each side of the opening which receives the knock out pin 21 so that no oil or air will be trapped between the head 22 of the knock out pin and the end of the sleeve. As shown in Fig. 5 the sleeve is also provided with escape or vent openings 53, one adjacent each end thereof, which openings extend through the wall and permit communication between the bore of the sleeve and the bore of the bushing 14. Adjacent these openings the sleeve is cut away or provided with a groove 54 which groove communicates with the openings 53 and permits escape of the oil.

Also, as shown in Figs. 2 and 3, an oil escape port 55 extends through the frame part 10 and also through the bushing 14 so as to permit escape of any oil that may be present within the bushing. It will be noted from Fig. 5 that the groove 54 extends the full length of the sleeve 15 and any oil that is expelled from the interior of the sleeve through the openings 53 will be permitted to pass into the bushing 14 through the groove 54. Therefore, the drain passage 55 permits the escape of all oil which might be trapped in the sleeve 15 or bushing 14.

The enlarged portion 20 of the knock out pin is provided with a flattened portion 57, and the reduced end 19 is also provided with a flattened portion 58 so that oil or air passages will be provided between the part 20 and the bushing 14 and also between the part 19 and the thimble 17 which will permit a certain amount of oil to flow into the sleeve and bushing to lubricate the parts. This provision for preventing the trapping of the oil during the operation of the device eliminates resistance to the movement of the knock out rod and knock out pin.

The position of the parts at the end of a heading operation is shown in Fig. 1. At this time the sleeve 15 is at the rear end of its stroke with the lug 27 abutting the hardened plug 25, and the head 22 of the knock out pin 21 is at the rear end of the sleeve 15 abutting the front end of the smaller portion 19 of the knock out rod. It will be seen that the knock out pin has a bearing at each end of the sleeve 15 and also a bearing in the die 12, thus giving it a three-point support, the intermediate point being substantially midway between the other two. The unsupported length of the knock out pin with this arrangement is never more than eight times the diameter of the pin or the diameter of the work piece so that there will be no bending or bowing of the pin.

As shown in Fig. 2, the lever 30 has been partially rocked around its pivot 21 and the enlarged portion 20 of the knock out rod has been driven forwardly so that its forward end contacts the thimble 17. At this time the head 22 of the knock out pin has been moved forward by the part 19 of the knock out rod until the head is substantially in contact with the front end of the sleeve 15.

Further movement of the lever 30 in a counter-clockwise direction moves the sleeve 15 forward, with the knock out pin 21, from the position shown in Fig. 2 to that shown in Fig. 3 wherein the front end portion of the sleeve 15 is against the back of the die. This is the extreme forward position of the parts wherein the work designated by the character "X" is expelled from the die.

When a new blank is inserted in the die the knock out pin 21 is driven rearwardly carrying with it the sleeve 15. However, the lug 27 upon the forward end of the sleeve strikes the hardened plug 28 and limits the rearward movement of the sleeve to the position shown in Fig. 2, while the head 22 of the pin moves rearwardly in the sleeve to contact the thimble 17. Thus the movement of the sleeve is limited as compared with the movement of the pin, and thus the sleeve provides a point of support for the pin intermediate the ends thereof.

During the movement of the knock out rod and knock out pin the passages 51, 53, 54 and 55 provide for the escape of oil and air which might otherwise be trapped in the bushing and sleeve, and thus provides for free operation of the parts.

While I have shown and described a preferred embodiment of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the claims.

What I claim is:

1. Means for ejecting a work piece from a die of a header or like machine having a frame and a die supported on the frame and having an opening therethrough, said means comprising a knock out pin mounted on the frame for movement into the die opening, a sleeve in which the rear end of said pin is slidably mounted, means at each end of said sleeve providing openings of smaller size than the sleeve bore, said pin having a head snugly fitting the bore of the sleeve, the body of the pin snugly fitting the opening at the forward end of the sleeve, a bushing in the frame in which said sleeve is slidably mounted, a knock out rod having an enlarged body portion slidably mounted in said bushing, a reduced forward end portion extending into the sleeve through the opening at the rear end thereof and snugly fitting said opening, said sleeve being of shorter length than said pin whereby the latter is supported by the sleeve at spaced points along its length, a lug on said sleeve, and means on the frame engaging said lug to limit movement of the sleeve away from the die.

2. Means for ejecting a workpiece from a die of a header or like machine having a frame and a die supported on the frame and having an opening therein, said means comprising a knock-out pin slidably mounted in the frame for movement into the die opening, a sleeve slidably mounted in the frame into which the pin extends, said sleeve having a bore larger than the diameter of the pin and having a reduced opening at its forward end through which the pin is slidably guided, a guiding head sleeve an ejecting rod having a forward end adapted to

on the rear end of the pin snugly fitting the bore of said enter said sleeve and engage said head to move said pin relatively to the sleeve during a part of the forward movement of the rod, said head engaging the forward portion of the sleeve during the latter part of the movement of the rod to move the sleeve and pin together, and means at the forward end of the sleeve to engage a part of the frame to limit movement of the sleeve in a rearward direction.

3. Ejecting means as in claim 2 wherein the sleeve is provided with a vent opening through its wall and a groove on its exterior surface communicating with said

opening, and the frame is provided with a drain passage communicating with said groove.

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