United States Patent [19]

Doudet

[11] **3,738,144**

[45] **June 12, 1973**

[54] **INVERSE DRAWING PRESSES**

[75] Inventor: **Michel Doudet,** Chatillon S/Bagneux, France

[73] Assignee: **SECIM,** Courbevoie, France

[22] Filed: **July 12, 1971**

[21] Appl. No.: **161,721**

[52] **U.S. Cl.** **72/255,** 72/263

[51] **Int. Cl.** **B21c 23/00**

[58] **Field of Search** 72/257, 263, 255, 72/272

[56] **References Cited**

UNITED STATES PATENTS

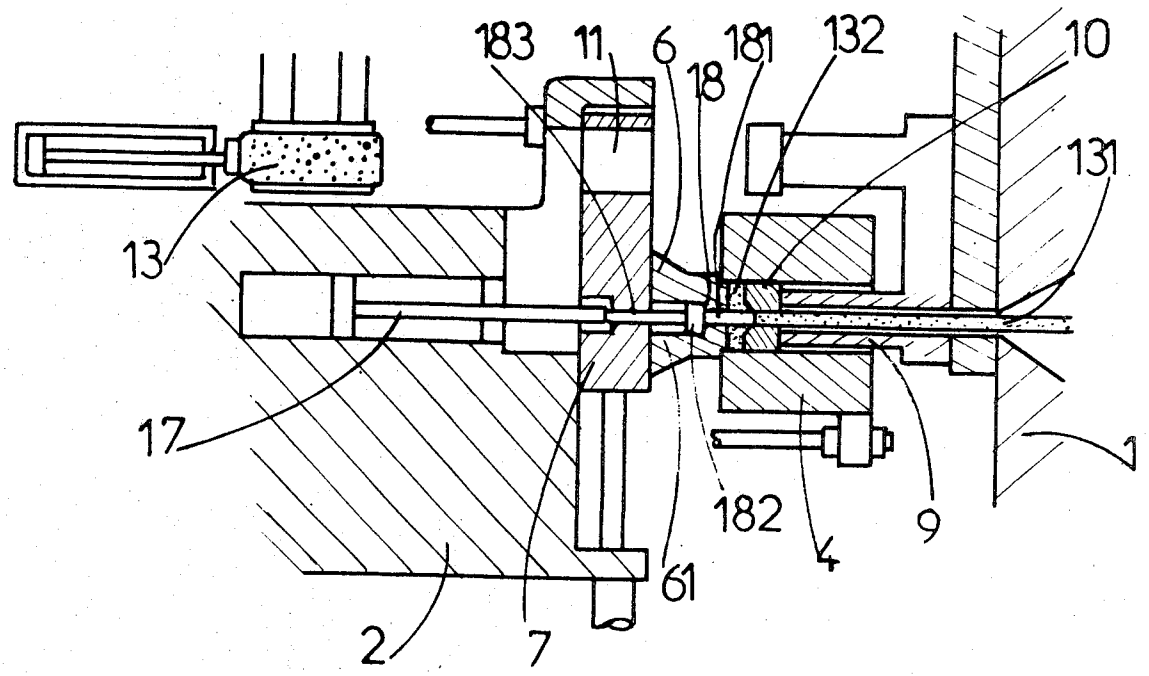
1,609,988	12/1926	Bull	72/255
3,530,702	9/1970	DeRidder	72/272

Primary Examiner—Charles W. Lanham
Assistant Examiner—Robert M. Rogers
Attorney—Cameron, Kerkam & Sutton

[57] **ABSTRACT**

An inverse drawing press has a movable cross-member and a fixed cross-member which carries the die. The movable cross-member carries a bottom for a container moved over the die and receiving the ingot. A punch carried by the bottom for the container separates the end of the bar in the die from the shoe and shear cuts off the shoe. A ram removes any residual metal from the container.

2 Claims, 8 Drawing Figures



PATENTED JUN 12 1973

3,738,144

SHEET 1 OF 3

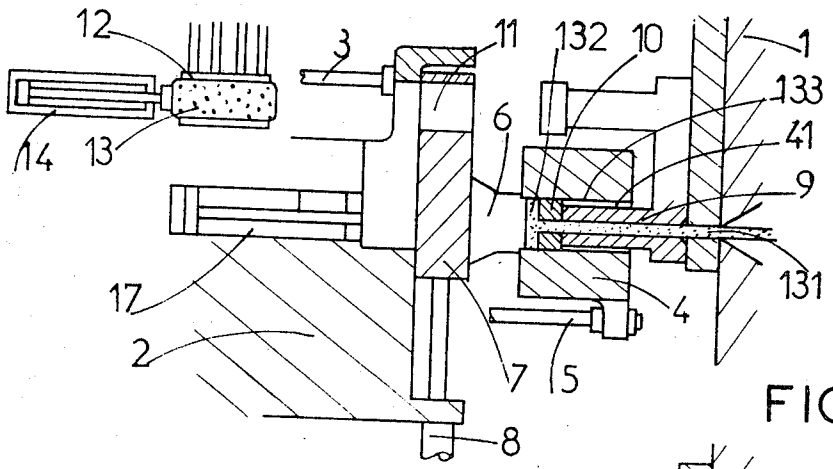


FIG:1

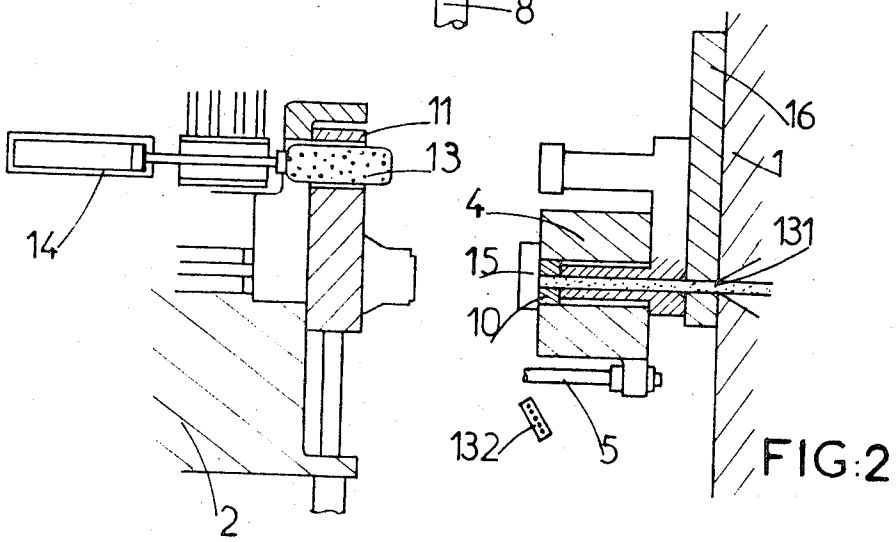


FIG:2

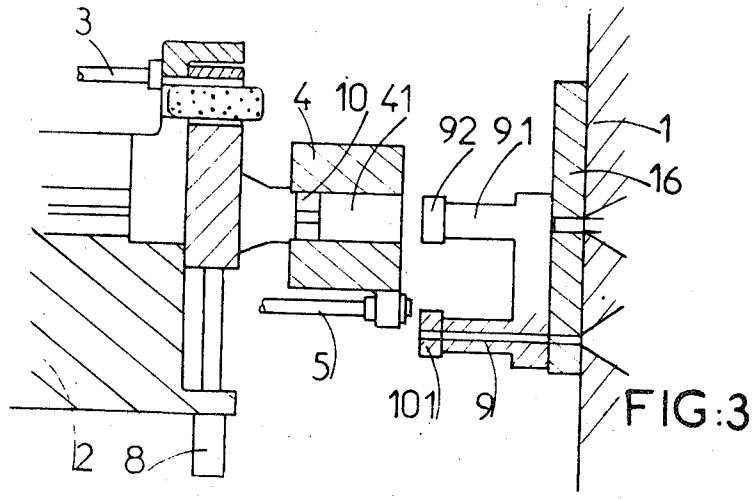


FIG:3

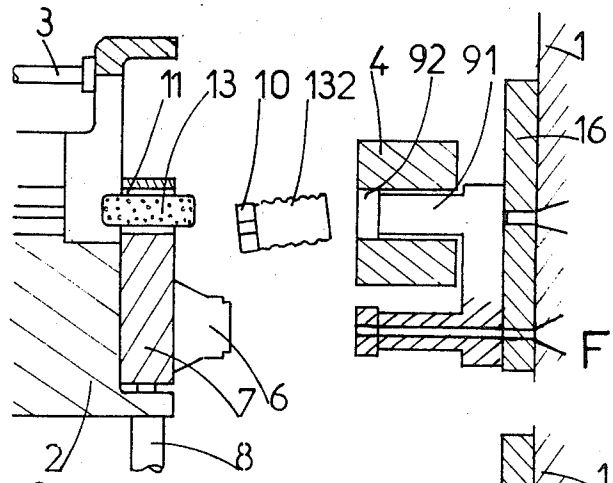


FIG:4

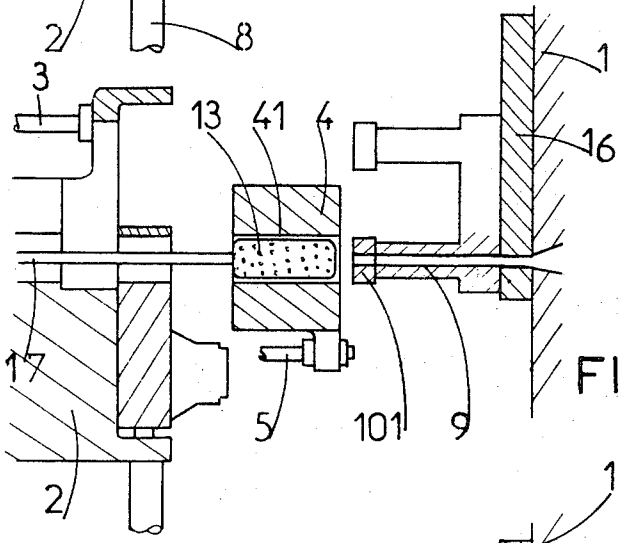


FIG:5

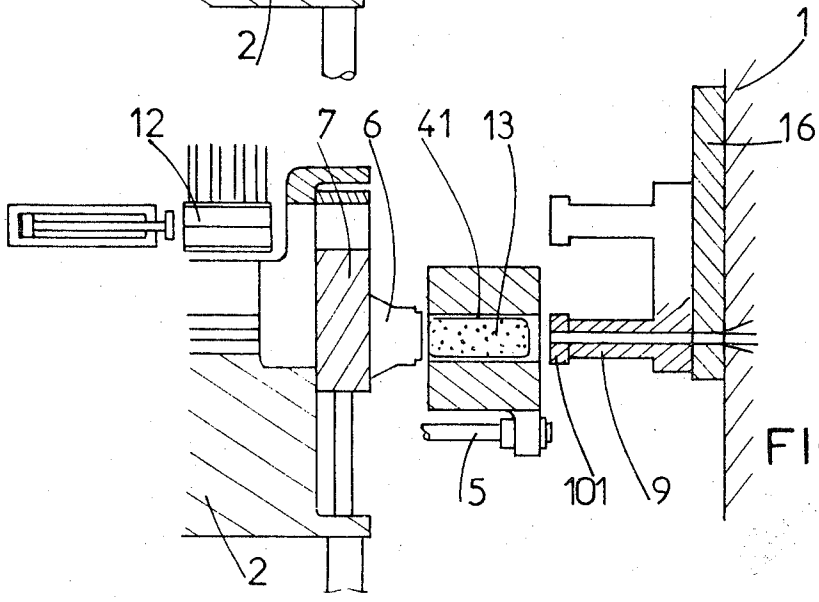


FIG:6

FIG:7

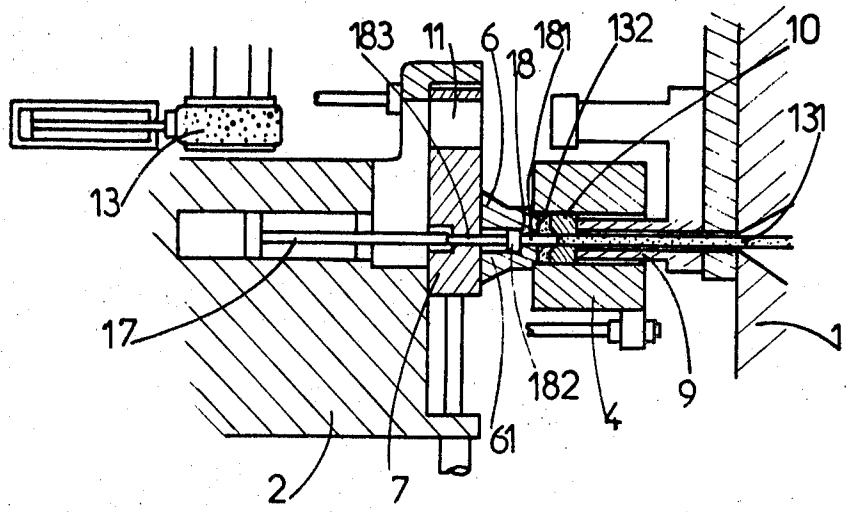
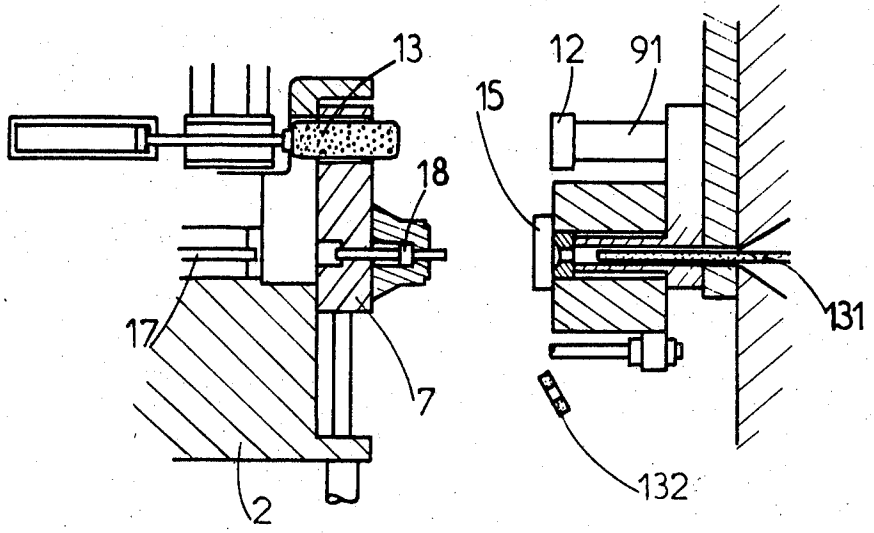

183
11
6
18
181
132
10
131
13
17
182
4
9
1
61
2
7

FIG:8


13
12
91
15
18
17
131
7
132
2

INVERSE DRAWING PRESSES

BACKGROUND OF THE INVENTION

The present invention relates to improvements in inverse drawing presses.

Inverse drawing presses usually have a fixed cross-member and a movable cross-member with means for moving said members toward and away from each other. Such means usually are hydraulic and further include a movable container moving with the movable cross-member and having a chamber for the ingot opening toward the fixed cross-member and closed toward the movable cross-member by a bottom for the container and further include a ram mounted on the fixed cross-member in the drawing axis to penetrate into the interior of the container during displacement of the movable cross-member and of the container toward the fixed cross-member.

The bottom for the container, interposed between the container and the mobile cross-member, may require replacement and it has already been proposed to mount it on a support movable perpendicularly to the drawing axis in such a way as to place on this support a base or bottom to replace the used base bottom for the container by a simple sliding of or rotation of the movable support. At the end of the drawing operation, there remains in the chamber of the container a residue of the ingot shaped like a cup extending along the walls of the chamber in a thin envelope due to the clearance between the die placed at the end of the ram and the wall of the chamber.

To remove this residue and envelope, it is generally pushed out by a ram from the container after withdrawal of the bottom of the container. The base of the cup is then sheared off and the envelope then forced from the interior usually with the die adhering to it. A new head is then placed on the extremity of the ram equal to the section of the container and the new head is advanced in the container in such a way as to engage the envelope and remove it.

During these steps, a new ingot is brought into the drawing axis between the bottom of the container and the container which new ingot is then moved into the chamber of the container during its movement. Under these circumstances, it is necessary that there be between the extreme withdrawn position of the bottom of the container and the end of the ram a distance equal at least to the length of an ingot plus the length of the container.

SUMMARY OF THE INVENTION

The present invention has for its object improvements simplifying the charging operation of the new ingot and to decrease the length of the displacement of the movable cross-member thus providing more compact presses.

In accordance with the present invention, the support for the bottom of the container is mounted on a carriage which can be moved into the drawing axis by displacement of the base, the press including means for introducing an ingot into said carriage when the bottom for the container is placed in the drawing axis and includes means for moving said ingot into the chamber of the container when the support is moved into the drawing axis.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference to the accompanying drawings in which like reference characters indicate like parts. In these drawings, in which preferred embodiments of the present concept are shown,

FIGS. **1, 2, 3, 4, 5** and **6** show different phases of the cycle of a press provided with the improvements of this invention; and

FIGS. **7** and **8** show schematically a further improvement, FIG. **7** showing the movable cross-member in its position at the end of the drawing cycle and FIG. **8** showing the movable cross-member in withdrawn position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference now to the several figures of the drawings, the press has a fixed cross-piece **1** connected to a base by mountings not shown and a movable cross-piece **2** connected to the base by a plurality of pistons **3** for moving the cross-member **2** toward and away from cross-member **1.** The main drawing piston, not shown, drives movable cross-member **2** toward cross-member **1.** A container **4** is connected to the base by a plurality of pistons **5** and is provided with a pocket **41** to receive the ingot.

Pocket **41** is closed on the side of the movable cross-member **2** by a container base **6** mounted on carriage **7** moved by piston **8** perpendicular to the drawing axis. A ram **9** is mounted on the fixed cross-member and is provided at its extremity with a die or drawing nozzle **10** having a cross-section slightly less than that of chamber **41.**

At the end of carriage **7** is pocket **11** in the axis of a pusher and chute **12** for introduction of a new ingot **13.**

FIG. **1** shows the position of the press at the end of the drawing operation. The ingot, compressed between the ram and the bottom **6** of container **4** has extruded as a bar **131** moving through an axial opening in ram **9.** There remains in the bottom of chamber **41** a shoe **132** forming a cup with a thin envelope **133** in the clearance between the die **10** and chamber **41** and adhering to the wall of chamber **41.**

At the end of the drawing operation, an ingot **13** is brought to the charging chute **12.** The press is provided with a piston **14** in the axis of the charging chute **12** and of pocket **11.**

After the end of a drawing operation, movable cross-member **2** is withdrawn as shown in FIG. **2.** At the same time, piston **14** pushes ingot **13** into place in pocket **11.** At the same time, container **4** is moved toward the fixed cross-member **1** in such a way as to move shoe **132** out of chamber **41.** Shoe **132** is then cut off by shear **15** moving over the rear face of container **4.** Bar **131,** separated from the shoe, can then be removed from the press.

Container **4** is then moved to the position shown in FIG. **3,** the die **10** remaining within chamber **41.** As seen in FIG. **3,** ram **9** is mounted on a support **16** sliding along fixed cross-member **1** and having a second ram **91** carrying at its extremity a head **92** of diameter equal to that of chamber **41** of container **4.** Another die **101** may then be placed on the extremity of ram **9.**

Container **4** is then moved again toward the fixed cross-member **1** as shown in FIG. **4.** Head **92** moves

into chamber 41 and scrapes the wall of this chamber thus removing envelope 132 and die 10 therefrom. At the same time, carriage 7 is moved perpendicularly to the drawing axis by piston 18 in such a way that ingot 13, carried in pocket 11, is moved into the drawing axis. The bottom 6 of container 4 is disengaged at this time And then replaced if necessary. A charging piston 17 is mounted on movable cross-member 2 in the drawing axis.

After clearing of chamber 41, container 4 is moved off of ram 91 and into position adjacent ram 9. Piston 17 then pushes ingot 13 into chamber 41 (FIG. 5). Ram 9, carrying on its extremity new die 101 is meanwhile moved into the drawing axis by sliding support 16 along fixed cross-member 1. Carriage 7 is then moved to bring bottom 6 of container 4 into position opposite the end of chamber 41 as seen in FIG. 6. On displacing the movable cross-member 2 toward the fixed cross-member 1 by means of the main drawing piston, the bottom 6 of container 4 is placed against container 4 and closes it. The die 101 then moves into chamber 41 and a new bar is formed by extrusion of ingot 13. During this stage, a new ingot can be mounted in charging chute 12.

In the embodiment of the present concept just described, shearing of shoe 132 is carried out by a shear 15 moved over the rear face of container 4.

However, the drawing die 10 on the end of ram 9 generally has an enlarged entry to facilitate passage of the metal of the ingot into drawing die 10. It follows that, after cutting off of shoe 132 by a knife 15, the end of bar 131 in the die has a slightly greater diameter than that of the drawing die and therefore passes with difficulty through it. Further, shearing may also cause burrs which resist removal of the bar. It is therefore necessary to exert on the bar a certain amount of force to remove it from the die. This is not inconvenient when the bars have a small diameter since the bars usually extend over apparatus located behind the press which apparatus provides the necessary force to disengage the bar. However, when the bars have a relatively large diameter, for example greater than 40 mm., the bar extends, on leaving the press, onto a roller table which can provide no pulling force on the bar. Consequently, to disengage the bar from the die, it is necessary, by reason of the locking of its end, either to exert a pulling force on the bar by hand or by a special pulling device. The invention has for a further object two improvements to overcome these inconveniences.

Presses for manufacture of tubes already have used apparatus for separation of the bar from the shoe in the form of a striker located in the bottom of the container and in the drawing axis and including a punch of slightly less diameter than that of the drawing die and entering the drawing die by axial movement through the shoe thus separating the bar from the shoe.

Usually, this punch is mounted on a base forming a piston slidably mounted in an axial chamber formed in the bottom of the container, the assembly thus including a piston actuated by an oil under pressure and acting on the punch with a force necessary to pass the punch through the shoe and enter the die.

This arrangement provides excellent separation of the bar avoiding burrs and any enlargement of the end of the bar but it is inconvenient in requiring the addition, in the bottom of the container or in its carriage, of a supplementary piston and means for feeding this piston with oil under pressure.

The improvements above-described in addition to the advantages which they provide for charging the ingot also facilitate separation of the bar from the shoe.

In another embodiment, the bottom of the container is provided with an axial punch, per se known, and capable of detaching the bar from the shoe by axial displacement of the axial punch at the end of the drawing cycle by means 17 for moving the ingot into container 4.

FIGS. 7 and 8 show schematically and partially a press provided with these further improvements.

FIG. 7 shows the position of the press at the end of the drawing cycle. The ingot, compressed between die 10 mounted on ram 9 and the bottom 6 of container 4 passes through the die and forms bar 131, a shoe 132 remaining between die 10 and bottom 6.

In this embodiment, the bottom of the container is provided with a rod 18 forming a punch 181 of a diameter slightly less than that of the die and mounted on a base 182 sliding in an axial opening 61 in the bottom 6 of container 4.

This arrangement is per se known, passage 61 generally forming a chamber for piston 182 formed by the base of the punch and driven when the chamber is fed with oil under pressure.

In accordance with the present invention, rod 18 is extended on the side opposite the punch by a rod 183 which passes through carriage 7 for bottom 6 of container 4 and opens on the side opposite bottom 6.

Rod 183 being located in the axis of bottom 6 of container 4, that is in the drawing axis, when the press is in drawing position, rod 183 is thus located opposite the extremity of piston rod 17.

In the first embodiment described above, piston 17 is used only to introduce ingot 13 into container 4 after movement of carriage 7 places ingot 13 in pocket 11, and then in the drawing axis.

In the second embodiment of the present invention, piston 17 also actuates rod 18 by engaging the extremity of rod 183. Punch 181 then enters the die as seen in FIG. 7 and separates bar 131 from shoe 132.

After this operation, movable cross-member 2 is withdrawn to the position shown in FIG. 8, piston 12 being withdrawn, and rod 18 is withdrawn. Shoe 132 can be removed, as previously indicated, by a shear 15 displaced over the rear portion of container 4 or any other suitable means. Separation of bar 131 already having taken place, removal of the shoe is facilitated and the formation of burrs on the rod is avoided. Further, the end of bar 131 is perfectly disengaged since the punch 181 has a diameter practically equal to that of the bar and enters the die through the enlarged portion thereof. Bar 131 can thus be removed without difficulty even if it has a large diameter since its extremity is completely disengaged from the die.

The rest of the cycle is carried out as indicated above. Ingot 13 is brought into the drawing axis by displacement of carriage 7 along movable cross-member 2 and is then introduced by means of piston 17 into the opening of container 4 after container 4 has been cleared by means of second ram 91 provided with clearing die 92.

Piston 17 is withdrawn, the bottom 6 of container 4 is brought into the drawing axis by displacement of carriage 7 and rod 18 returns by free movement to with-

drawn and initial position when bottom 6 of container 4 is applied against container 4 and the ingot by the movement of movable cross-member 2 beginning a new drawing operation.

It is thus seen that the embodiment which has just been described provides separation of the bar from the shoe and a perfect disengagement of the extremity of the bar from the die.

It should be understood that, if the rod 18 remains in extended position after withdrawal of movable cross-member 2, it will be necessary to withdraw movable cross-member 2 sufficiently for bottom 6 of container 4 to move behind the container when the container has been disengaged from ram 9. The additional distance then necessary corresponds to the depth of penetration of the punch in the drawing die. This being a minimum, no marked inconvenience is introduced. On the other hand, if it is desired to reduce the dimensions of the press as much as possible, a spring may be placed in chamber 61 to withdraw rod 18 after return of piston 17.

The present invention is not limited to the details of the preferred embodiments discussed above. Modifications of these embodiments may be made within the present inventive concept. The sliding support for the bottom 6 of container 4 and of the ram could, for example, be unitary and move at the same time. Further, the moving supports could rotate about an axis parallel to the drawing axis. Such a support for the bottom of the container could, for example, include two arms carrying at their extremities a bottom for the container between which would be placed two other arms connected at their extremities to a pocket for the new ingot. Further, a replacement bottom for the container could be placed in advance on the rotating support and thus avoid alternating movements of the support. Still further, piston 14 for introducing ingot 13 into pocket 11 could be replaced by a push lever for the ingot actuated by the withdrawal movement of the movable cross-member 2.

What is claimed is:

1. An inverse drawing press for drawing a bar from an ingot comprising a fixed cross-member, a movable cross-member means for moving said cross-members toward and away from each other, a container having an axial chamber for the ingot open adjacent said fixed cross-member and closed when adjacent said movable cross-member, a bottom for said container, a carriage for said bottom on said movable cross-member and displaceab'e in a plane perpendicular to the drawing axis, a pocket in said carriage, an extension mounted on said fixed cross-member in the drawing axis, a drawing die on said extension, said pocket being movable into the drawing axis by displacement of said carriage, means for introducing an ingot into said pocket when said bottom of said chamber is located in the drawing axis, means for moving the ingot into said container when said pocket in said carriage is in the drawing axis, a punch mounted for axial movement in said bottom of said container to detach the bar from the shoe, said punch being actuated at the end of the drawing cycle by said means for moving the ingot into said container.

2. A press as described in claim 1, said punch having a diameter of slightly less than that of said die, a piston base for said punch sliding in a chamber in the axis of said bottom of said container, said means for moving said ingot into said container including a shaft for said piston in the drawing axis, said shaft extending opposite said punch and passing through said carriage, said means for moving the ingot into said container engaging the extremity of said shaft and actuating said punch at the end of the drawing cycle.

* * * * *