Sept. 18, 1945. H. LORANT 2,385,144

DISCARD SHEARING TOOL FOR EXTRUSION PRESSES

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Fig. 1.

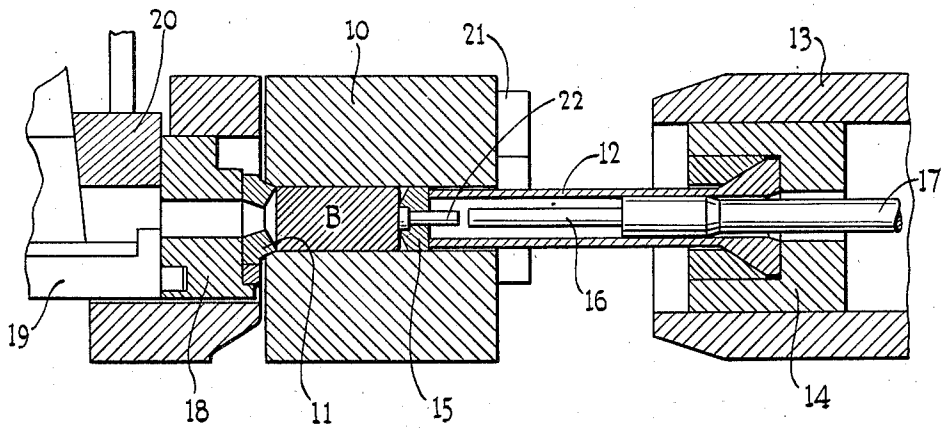
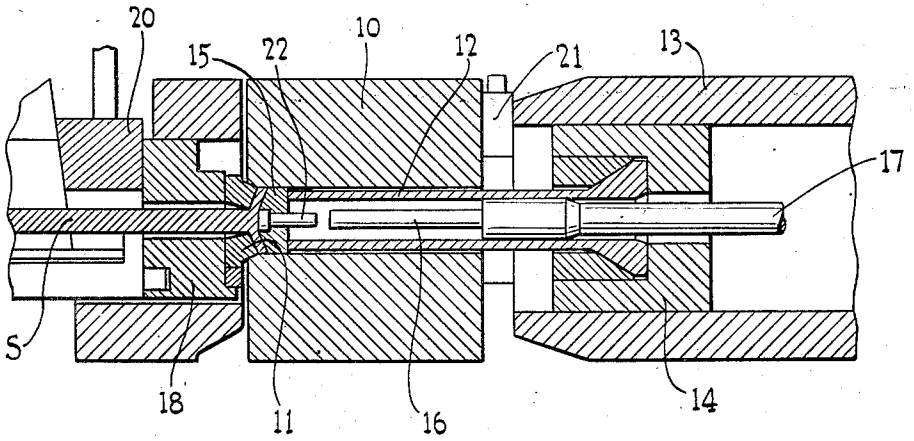


Fig. 2.



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Fig. 3.

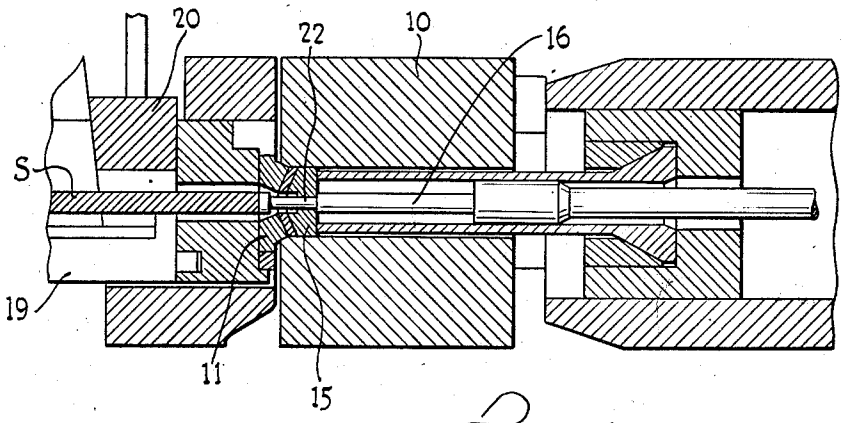


Fig. 4.

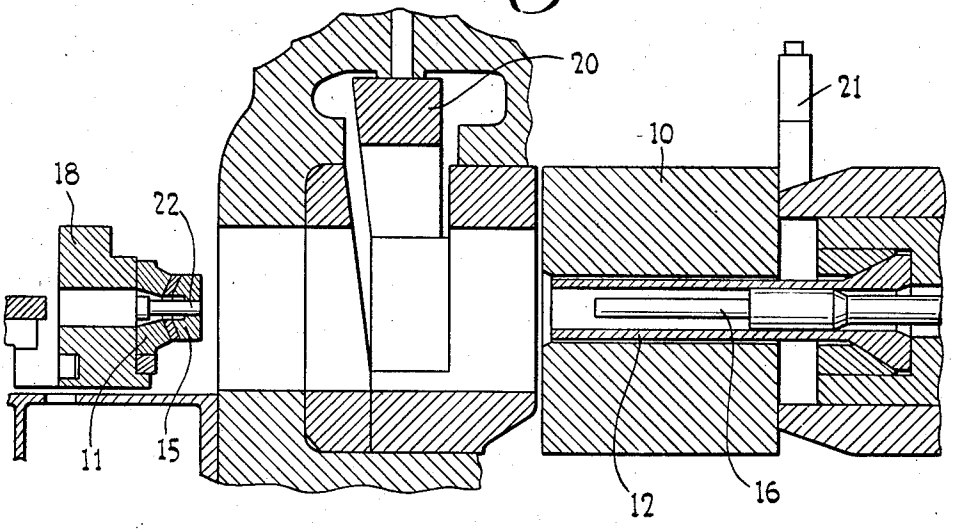
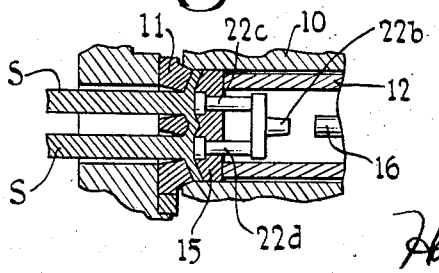


Fig. 5.



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Patented Sept. 18, 1945 2,385,144

UNITED STATES PATENT OFFICE

2,385,144

DISCARD SHEARING TOOL FOR EXTRUSION PRESSES

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Application June 23, 1943, Serial No. 491,867
In Great Britain April 9, 1942

2 Claims. (Cl. 207—2)

This invention relates to the extrusion of heated metal billets, which are squirted from a container of an extrusion press into which they have been placed through a die so that strands of various desired shapes and contours are produced, and it refers in particular to the provision of means by which the discard or butt-end of the billet material which is left in the container after each operation can be efficiently and easily severed from the strand.

The existence of this discard or butt-end is due to the established practice according to which the stroke of the billet-extruding tool is terminated a short distance from the die so that a thin residue of billet material will be left between the die and the press-stem or rather between the die and the press-disc which is usually placed in front of the press-stem to prevent its rapid wear. This piece of residue which forms the so-called butt-end of the extruded strand and which is clamped firmly between the die and the press-disc and sticks to at least one of them, must be cut off the strand in order that the latter can be separated from the die and the press-disc, prior to its removal from the press.

Heretofore, it was customary to move the die and the press-disc with the butt-end still clamped between them, together with the strand, to the rear of the press and to effect the cutting-off of the butt-end or residue from the strand by special shearing means which accordingly had to be arranged outside the press at some distance. These means were very heavy and bulky and therefore added considerably to the weight and cost of the press.

It is an object of this invention to provide means for cutting off the butt-end or residue from the strands produced on an extrusion press, which means permit the shearing operation to be carried out in an efficient manner inside the press and which means further do not require any extra equipment for their operation, but can be incorporated in a simple way into any existing tube-extrusion press, provided this press has means which permit the mandrel to be moved independently from the press-stem.

The discard shearing tool according to the invention is adapted to take the place of the mandrel and to be operated by the independent mandrel-moving means, so that the tool of the invention is, in the first place, destined and suitable to be fitted to tube-extrusion presses when their mandrels and mandrel-moving means are not required as in the case of the production of solid material, such as bars, rods, shapes, etc.

According to the main characteristics of the invention, the discard shearing tool has the shape of a pin with an enlarged head at its forward end and a short shank at its rear; it is further adapted to be loosely inserted into an axial bore of the press-disc of corresponding configuration so that the shank can be engaged and pushed forward by the mandrel-holder or an equivalent part of the mandrel-moving means. The head of the pin has preferably the same diameter as the die-aperture at its narrowest position, the forward edge of the pin being sufficiently sharp to cut the residue off the strand in a manner which will be presently described.

Normally, the pin is so positioned in the press-disc that it does not project substantially, if at all, from the billet-engaging surface of that disc. The pin will remain in this position up to and also during the actual extrusion. During this stage the pin will form a part of the billet-engaging surface of the press-disc and as such will take part in the transmission of pressure to the billet itself. After the extrusion of the billet into a strand has been completed, there will be only a thin layer of billet-material left as a residue between the press-disc and the die which forms the butt-end of the strand. The pin is now pushed forward by means of the mandrel-holder or its equivalent a distance sufficient to force the pin through the residue and into the die-aperture, whereby the residue will be cut off the strand and the latter can be freely withdrawn from the die to the rear of the press for further handling.

After the extrusion proper has been completed, all that remains to be done is to free the press-disc and the pin and, if necessary, the die from any residue adhering to them and thus make them fit for further use. This is effected in the well-known manner by moving these parts to the rear of the press and into easily accessible positions, either separately or simultaneously, according to whether the residue sticks to the press-disc and the pin only (as will be mostly the case) or to the die as well, thus "welding" the latter to the press-disc. The residue can then be loosened from any surface to which it adheres by a few light blows.

One embodiment of the invention is illustrated in the accompanying drawings by way of example, the figures being all part-sectional elevations and showing the different stages of operation of an extrusion press to which a tool according to the invention has been fitted.

Figure 1 shows a press before extrusion.

Figure 2 shows a press after extrusion has been completed but before the residue is cut off.

Figure 3 shows the residue being cut from the strand by means of the tool according to the invention.

Figure 4 shows the die-assembly with the press-disc removed from extrusion position.

Figure 5 is a detail view of a modified form of construction.

In the drawings, 10 denotes the billet container of a horizontal hydraulic extrusion press into which a hot billet B has been placed, and 11 the die through which the billet is to be squirted so as to form a long strand S. This operation is carried out by means of a hollow press-stem 12 attached to the hollow main-ram 13 by a ring 14. A press-disc 15 is placed before the press-stem so as to prevent the wear of the latter.

Arranged inside the press-stem 12 and the main-ram 13 are a holder 16 for a mandrel (not shown here) and a shaft 17 which connects the holder to a separate hydraulic drive independently operable from the press-stem 12.

The die 11 is carried on a holder 18 which can be shifted backwards and forwards by means of a hydraulic gear of which only a part of the ram 19 is shown in the drawings. The die-assembly is locked firmly in position through a wedge 20 whereas the stroke of the main-ram 13 is limited by a removable stop-plate 21 suspended in front of the container by means not shown here. The parts 20 and 21 are preferably connected to common lifting means which will move them into their inoperative positions when desired.

The shearing tool according to the invention consists of a pin 22 inserted into an axial bore of the press-disc 15 so that normally, it does not project substantially, if at all, from the billet-engaging surface of the press-disc, but forms part of the latter. The pin 22 has an enlarged head and a short shank which normally projects a short distance from the press-disc so that it can be engaged by the mandrel-holder 16 when the latter is pushed forward. The diameter of the pin-head is the same as that of the die-aperture at its narrowest part, and its forward edge is sufficiently sharp to cut the residue off the strand S.

Before the extrusion proper, the parts are positioned as shown in Figure 1. A billet B has been placed into the container 10 and the press-stem is so far advanced that the press-disc with the pin 22 will bear against the billet, ready to squirt the billet through the die 11 on further advance of the press-stem.

In the next stage (Figure 2), the billet has been extruded into a strand S. The press-stem 12 with the press-disc 15 and the pin 22 has reached the end of its stroke and a thin layer of billet material is left between the die 11 and the press-disc 15 and the pin 22, which layer forms the butt-end of the strand. The pin 22 has been carried along with the press-disc by means of the shoulder formed between the head and the shank of the pin, whilst the mandrel holder 16 is still kept at a short distance from the press-disc and pin. The movement of the main-ram 13 during this stage is limited by the stop-plate 21.

After the completion of the extrusion proper, the pin 22 is pushed forward by means of the holder 16 or its equivalent and the drive associated therewith, so that the pin pierces the butt-end and enters the die-aperture. Through this action, the butt-end or residue will be severed from the strand S and the latter can be freely withdrawn from the die 11 to the run-out table of the press for further handling. This step is illustrated in Figure 3.

After this step, the press-disc 15 with the pin 22 and, if necessary, the die 11, will be freed from any adhering parts of residue to make them fit for further use. In most cases the residue will stick to the press-disc and the pin only, and not to the die which can be shifted back to the rear of the press without the press-disc by such well-known means as the gear associated with the ram 19 after the wedge 20 has been withdrawn. After the removal of the die-assembly, the press-disc, with the pin 22, will be moved forward by the press-stem 12 into the space formerly occupied by the die-assembly, after the stop-plate 21 has been lifted, where it can be easily reached and hauled to the back of the press for cleaning. Should, however, the residue stick to the die 11 as well and thus "weld" the latter to the press-disc and the pin, the press-disc will be carried along to the rear of the press, with the above-described movement of the die, as illustrated in Figure 4, whereupon the residue can be loosened from them by a few light blows.

In the foregoing, only one preferred embodiment of the invention has been described, but it will be understood that the invention can be carried out in other ways.

One alternative arrangement would be to attach the shearing pin 22 to the holder 16 or to its equivalent, instead of inserting the pin loosely into a bore of the press-disc. In this case, the shearing pin, instead of being moved to the rear of the press, together with the press-disc, as described above, will be retracted through the container 10, together with holder 16, after it has cut the residue off the strand S. In all other respects, the operation will be the same.

It is also possible to use the shearing tool of the invention in connection with dies having more than one aperture for the extrusion of a number of strands at one time. A tool adapted for that purpose would have as many pins as there are die-apertures, all arranged on a common shank to register exactly with those apertures. Figure 5 illustrates such a construction in which the die 11 is provided with two apertures forming two strands S, and the tool shank 22*b* is provided with two pins 22*c* and 22*d* which register with and correspond in size with the two openings in the die 11. The operation of this tool is the same as in the preceding figures.

The invention is not limited to horizontal or to hydraulic extrusion presses, but can be equally well applied to vertical and also to mechanical extrusion presses.

In all the arrangements described here, however, cutting off the residue from the extruded strand will be effected inside the press, without necessitating any elaborate and heavy equipment and this is one of the essential features of the invention.

I claim:

1. An extrusion press comprising a billet container having a through horizontal bore, a die at one end of said bore, a hollow press stem adapted to pass through the bore from the end opposite said die, the advancing end of said stem having a pushing surface, a press disc separate from said stem having an extended surface corresponding to the bore of said container of sufficient extent to provide for non-tiltable, slidable movement in said bore, said press disc having a rear surface for contact with the pushing surface of said stem

for movement thereby, said disc having a discard shearing tool slidably mounted therein, having at one end an enlarged head of a size to enter said die and shear the extruded material from the discard and the other end of said discard shearing tool extending through a reduced bore in said press disc and to the rear thereof, a plunger in said hollow stem adapted to contact said extended end of the discard shearing tool for shearing the extruded material from the discard, said die being movable from a position adjacent said billet container to a position spaced therefrom, whereby a billet may be extruded and the extruded material sheared from the discard and said discard shearing tool, press disc and discard left at the die end of said billet container for removal when said die is moved to a position spaced from the billet container.

2. An extrusion press having a billet container with a straight through bore, a die on one side of the billet container larger than said bore and a hollow extrusion stem on the other side of the billet container adapted to pass through said bore, the advancing end of said stem having a pushing surface, a conical seat on the die and a conical opening at the end of the bore of the billet container adjacent the die, to seat on said seat, a press disc separate from said stem having an extended surface corresponding to the bore of said container of sufficient extent to provide for non-tiltable, slidable movement in said bore, said press disc having a rear surface for contact with the pushing surface of said press stem for movement thereby, said disc having a discard shearing tool with an enlarged head, engaging with the billet engaging surface of the press disc, and a short shank extending through an opening in the press disc and projecting to the rear of the press disc and into the hollow press stem and being slidably and removably mounted in the press disc, a plunger in said hollow press stem adapted to be pushed forward against the end of the shank of said discard shearing tool to project the enlarged head of the discard shearing tool into the die opening to shear the discard from the extruded stock, said die, discard, press disc and discard shearing tool being movable from a position adjacent the end of said billet container to a position spaced therefrom, whereby a billet may be extruded and the extruded material sheared from the discard while the die is in position at the end of said billet container and said die, press disc and discard shearing tool with the discard therebetween left at the die end of the billet container for removal when said die is moved to a position spaced from the billet container.

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