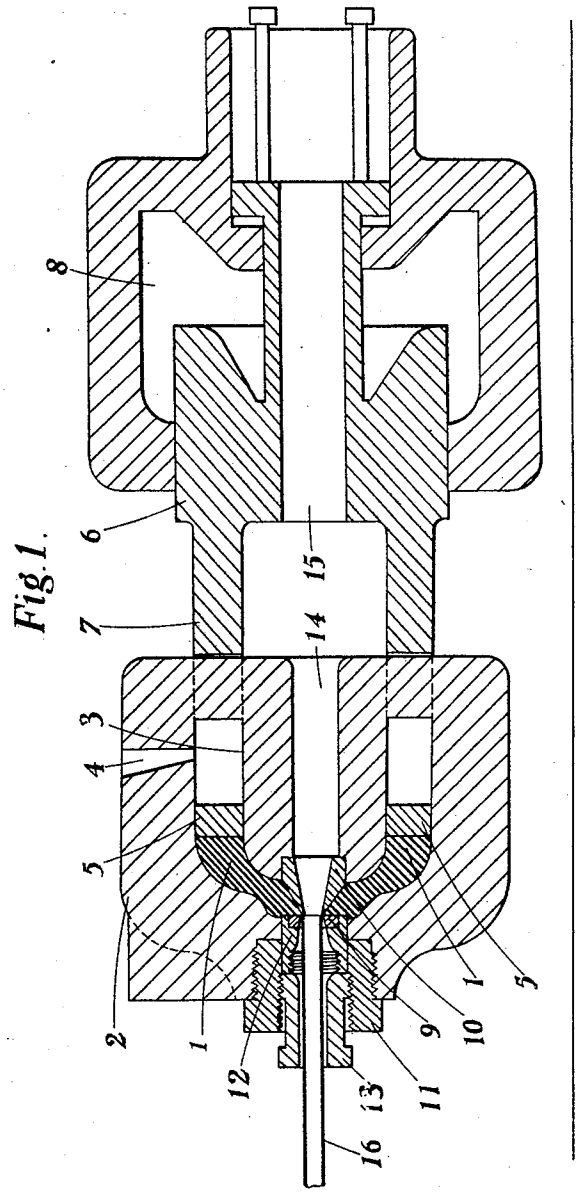
May 3, 1932. E. E. JUDGE ET AL 1,856,483

PRESS FOR THE EXTRUSION OF METALS

Filed Aug. 21, 1931 3 Sheets-Sheet 1

Fig. 1.



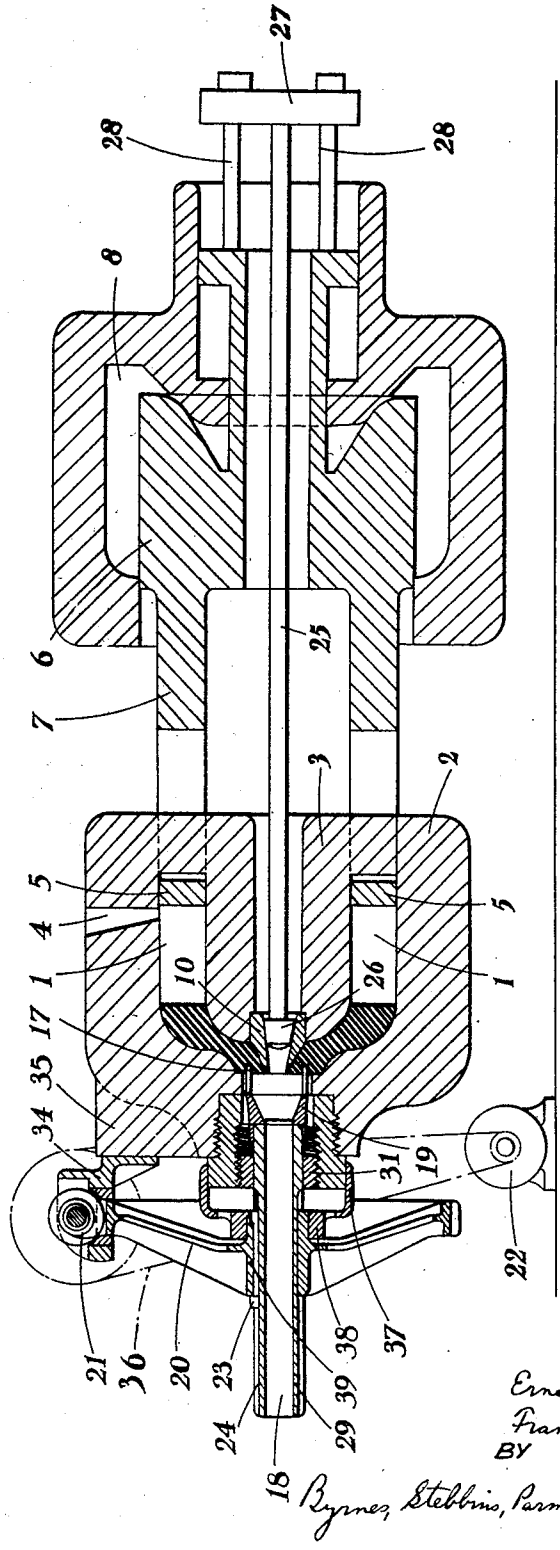
INVENTORS
Ernest E. Judge &
Francis H. Fry
BY
Byrnes, Stebbins, Parmelee & Blenko
ATTORNEYS

May 3, 1932. E. E. JUDGE ET AL 1,856,483

PRESS FOR THE EXTRUSION OF METALS

Filed Aug. 21, 1931 3 Sheets-Sheet 2

Fig. 2.



INVENTORS
Ernest E. Judge &
Francis H. Fry
BY
Byrnes, Stebbins, Parmelee & Blenko
ATTORNEYS

May 3, 1932. E. E. JUDGE ET AL 1,856,483

PRESS FOR THE EXTRUSION OF METALS

Filed Aug. 21, 1931 3 Sheets-Sheet 3

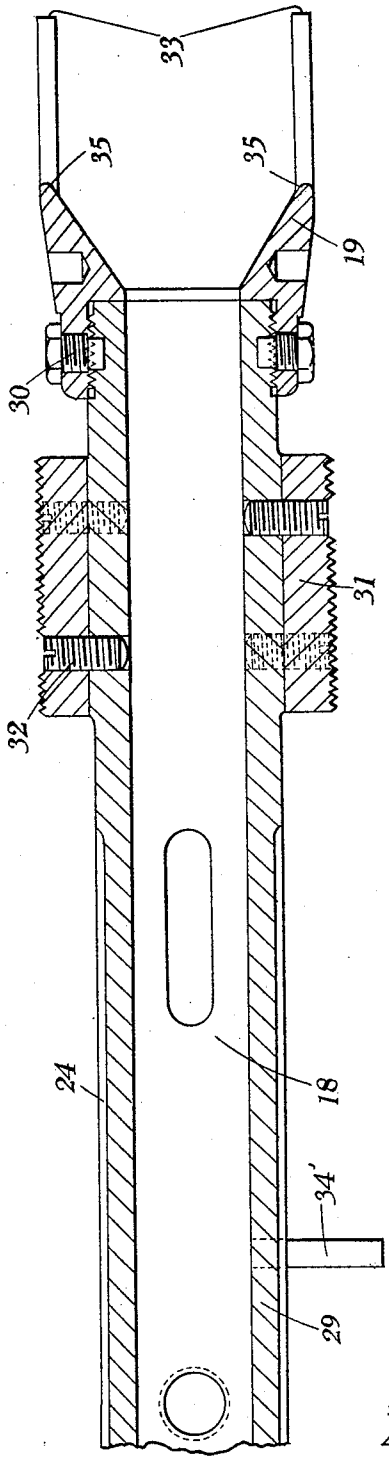


Fig. 3.

INVENTORS
Ernest E. Judge &
Francis H. Fry
BY
Byrnes, Stebbins, Parmelee & Blenko
ATTORNEYS

Patented May 3, 1932 1,856,483

UNITED STATES PATENT OFFICE

ERNEST EDWARD JUDGE AND FRANCIS HENRY FRY, OF GRAVESEND, KENT, ENGLAND, ASSIGNORS TO W. T. HENLEY'S TELEGRAPH WORKS COMPANY LIMITED, OF LONDON, ENGLAND, A BRITISH COMPANY

PRESS FOR THE EXTRUSION OF METALS

Application filed August 21, 1931, Serial No. 558,528, and in Great Britain September 24, 1930.

This invention relates to presses used for the extrusion of tubular lengths of lead or similar metal forming, for instance, the sheath of an electric cable. In the type of press to which the invention applies the metal is extruded through the annular space between two circular dies (the outer die will be for convenience of reference spoken of as the "die" hereinafter and the inner hollow tapered die as the "point"). At the end of a pressing operation the space between the point and die is left full of metal. When a change in the size of tube to be extruded is required to be effected it is necessary to take out the point and die and replace them by other similar members appropriate for the new size. The die can be readily removed since it is accessible from the outside of the press. The metal remaining between the die and the point may form an obstacle to the removal of the latter and will always prevent its replacement by a point of large size. Accordingly it is necessary to provide for a portion of the metal to be taken away. Hitherto this has been done either by melting the metal or by shearing off the piece lying in front of the point by forcing the latter forward after opening out a sufficiently large aperture in the end of the press and inserting there a ring to serve as the outer member of the sheathing press.

By the present invention we provide an improved arrangement for facilitating the removal and replacement of the point. In this arrangement after removing the die and the part or parts which immediately support it we insert in their place a tubular cutter or trepanning tool and rotate it while feeding it inward until it has cut through the greater part of the metal to be removed leaving only a thin layer directly adjacent to the point. We then remove the cutter and apply to the rear of the point sufficient pressure to force it forward through a short distance thereby breaking through the thin ring of metal which has not been cut. The point can then readily be pushed or drawn forward out of the press carrying with it the ring of metal. As this ring can be cut out at a larger diameter than the maximum diameter of the point the new point may easily be inserted into position through the aperture in the metal.

An example of the application to a metal extrusion press of the invention as set forth above is hereafter described with reference to the accompanying diagrammatic drawings.

Figure 1 shows diagrammatically in section a metal extrusion press as used for applying a lead sheath to an electric cable, and illustrates the condition of the press at the end of the extruding operation, previous to the changing of the point and die.

Figure 2 is a similar view with the die removed illustrating the cutting or trepanning operation.

Figure 3 is a detailed sectional view of the trepanning tool on a larger scale.

Previous to the extruding operation the lead is contained in a semi-molten or plastic state within an annular chamber 1 formed within a lead receiver 2 and surrounding a point holder 3 being introduced into this chamber in a molten condition through a suitable charging orifice 4. The discharge of the lead is effected by the movement of a piston 5 from its original position as indicated in Figure 2 to its extreme position indicated in Figure 1. This movement or pressure stroke is obtained by means of a hydraulic ram 6 having an extension 7 to which the piston 5 is attached, the ram being operated by hydraulic pressure within a cylinder 8.

The metal tube or sheath is formed by extrusion of the plastic metal between a die 9 and a point 10, its diameter and wall-thickness being controlled by the size and relative positions of these two components. Within the lead receiver 2 is held, by means of a strong screw-thread, a main block 11 which accommodates a die-holder 12 sliding therein and carrying the die 9; a sleeve 13 screwed into the main block 11 serves to support the die-holder in position against the pressure of the extruded metal.

Axial openings 14 and 15 in the ram 6 and the point holder 3 provide a path for the passage of the cable from the back of the press to the point of application of the metal

sheath. Figure 1 shows the metal tube 16 remaining after the sheathed cable has been detached from the press, and it is required to change the point and die to enable the sheathing of a cable of another diameter.

The supporting sleeve 13 is removed from its engagement within the main block 11, enabling the removal of the die-holder 12 to be effected by means of a tool which engages with a screw thread provided on the wall of the cylindrical passage through the centre of the holder; the die 9 is removed with the holder. Removal of the point 10 is hindered by the presence of a cylindrical mass of solidified metal 17.

Figure 2 shows the process of cutting a readily removable cylinder of metal from the front of the point 10 by means of a cutting or trepanning tool 18, the details of which are shown in Figure 3. The cutting tool 18 consists of a hollow cylindrical portion 29 carrying at one end a cutting head 19 attached thereto by means of a screw thread and locking pegs 30. A cylindrical threaded bush 31, which is made a driving fit on the cylindrical portion 29 and is prevented from rotating thereon by means of sunken screws 32, is of such dimensions that it may be screwed into the internally threaded aperture within the main block 11. The cutter head 19 is formed with cutting teeth the cutting edges of which are indicated at 33 in Figure 3. Rotation of the tool is effected by means of a driven worm wheel 20 which engages with the cylindrical portion 29 by means of a feather or key 23 sliding in a keyway 24. The worm wheel 20 engages with a worm gear 21 housed in a bracket 34 detachably mounted upon a projection or seating 35 which is formed upon the front of the lead receiver 2. The worm gear is driven from an electric motor 22 by means of a suitable gearing such as a chain drive 36 as indicated in Figure 2. A detachable cap 37 formed to fit over the main block 11 incorporates a bearing 38 which accommodates the hub 39 of the worm wheel 20 thereby serving to support the wheel during the cutting process. When rotated the tool is driven forward due to the guiding action of the engaging screw threads within the main block 11, the cutting edges 33 tending to remove a cylindrical block of metal from the front of the point 10. It is essential that the cutting operation should be arrested before the block of metal is completely severed to prevent possible damage to the point, the forward motion of the tool is therefore limited by the extent of the guiding screw threads and a pin 34′ may be attached to the tool as a visible indication of the extent of its forward travel. Lead strip produced by the cutting action is guided away from the teeth on the cutter head 19 by means of the chamfered edges 35, thereby preventing any tendency of the cutter to seize up.

Pressure is applied to the back of the point 10 by a rod or ejector bar 25 having a head 26 shaped to engage within the conical body of the point. The bar, inserted from the back of the press, has at its outer end a T-piece 27 which engages with two studs 28 attached to the end of the hydraulic ram 6, the latter having been returned to its original position as represented by Figure 2 before the cutting operation. A short stroke of the ram serves to drive forward the point, breaking through the thin remaining wall of metal, whereupon the point may be carried forward to the front of the press and removed by any convenient means.

The cutting or trepanning tool is designed to remove a block of metal of such a diameter that free passage is permitted for the maximum size of point which may be used with the press.

What we claim as our invention and desire to secure by Letters Patent is:—

1. In an extrusion press in which tubular lengths of metal are extruded through an annular space between an outer die and an inner die, an arrangement for the removal of the inner die, said arrangement comprising means adapted to be inserted in the annular space made available by the removal of the outer die for cutting a circular groove in the metal in front of the inner die, in combination with means for pushing forward the inner die to break the thin ring of metal left by said cutting means.

2. In an extrusion press in which tubular lengths of metal are extruded through an annular space between an outer die and an inner die, an arrangement for the removal of the inner die, said arrangement comprising means for supporting, driving and feeding forward a tubular cutter in the annular space made available by the removal of the outer die in combination with means for pushing forward the inner die to break the thin ring of metal left by the cutter.

3. In an extrusion press in which tubular lengths of metal are extruded through an annular space between an outer die and an inner die, an arrangement for the removal of the inner die, said arrangement comprising a tubular cutter, a screw-threaded body on said cutter near its cutting end, a block on the nose of the press, having internal screw threads in which said body works, and a rotary driving member for said cutter having a sliding connection therewith.

4. In an extrusion press in which tubular lengths of metal are extruded through an annular space between an outer die and an inner die, an arrangement for the removal of the inner die, said arrangement comprising means adapted to be inserted in the annular space made available by the removal of the

outer die for cutting a circular groove in the metal in front of the inner die, in combination with an ejector rod having a front end adapted to engage the rear part of the inner die and means for coupling the rear end of said rod with the ram of the press.

In testimony whereof we affix our signatures.

ERNEST EDWARD JUDGE.
FRANCIS HENRY FRY.