Oct. 29, 1940. A. J. N. DUCLOS 2,219,888

EXTRUDING APPARATUS

Filed Sept. 15, 1938

FIG. 1

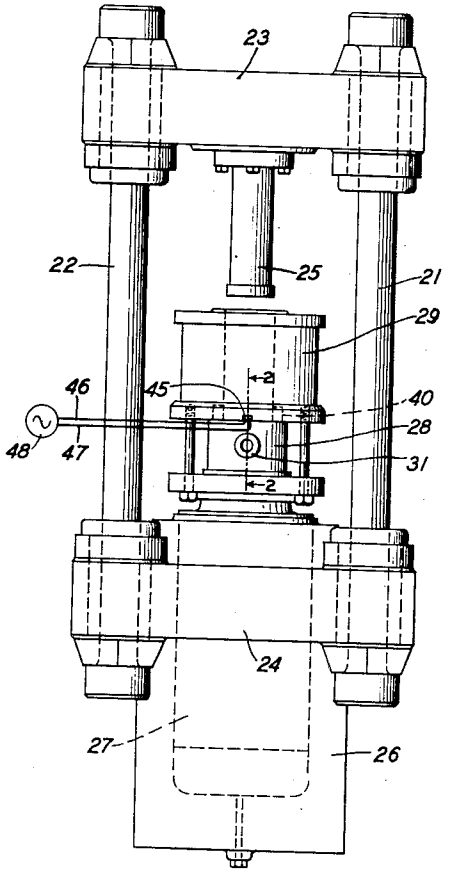


FIG. 2

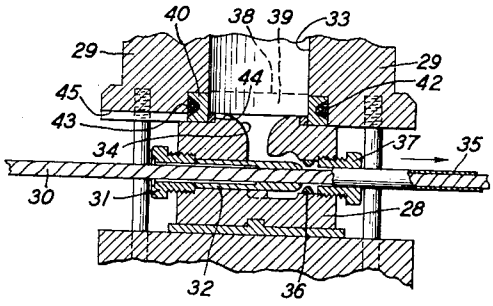
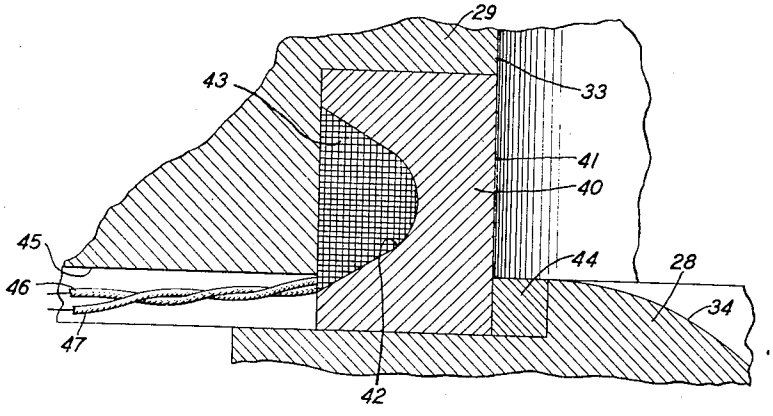


FIG. 3



INVENTOR
A. J. N. DUCLOS

BY E. R. Moulan
ATTORNEY

Patented Oct. 29, 1940 2,219,888

UNITED STATES PATENT OFFICE

2,219,888

EXTRUDING APPARATUS

Aeneas J. N. Duclos, South Orange, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application September 15, 1938, Serial No. 230,029

5 Claims. (Cl. 207—16)

This invention relates to extruding apparatus, and more particularly to a lead press for making extruded lead or lead alloy sheathing on electric conductor cable.

It has long been a familiar and much used procedure in the art of manufacturing electric conductor cables to provide a core comprising one or more electrically insulated electric conductor strands, with a seamless sheath of lead or lead alloy or the like material, by passing the cable core longitudinally of itself through a suitable chamber in an extrusion press, so that the press will form the material into a seamless tubular sheath about the core. The operation of such a press is ordinarily discontinuous, in that the cylinder of the press is filled with a supply of the metal to be extruded. This is then ordinarily not entirely extruded but a slug of the metal is left in the bottom of the extrusion cylinder upon which further molten metal is supplied for another extrusion. At the end of an operating period, for example a day's work, it is customary to leave the slug from the last extrusion operation in the cylinder, where it chills and hardens over night. This slug must then in some manner be softened or melted, when operations are re-commenced, to become united with the next charge of metal to be poured into the cylinder, in order that there may not be any lack of continuity in the metal extruded. When in regular operation the cylinder of such an extrusion press is ordinarily at a relatively high temperature, although usually not at or above the melting point of the metal being extruded, since the latter is ordinarily semi-solid or solid during the extrusion. Many devices and methods have been suggested in the past for melting the left-over slug from a previous operation. The prime difficulty of such procedures has always been the great mass of the cylinder itself and its associated parts, which require to be heated together with the slug if an attempt is made to melt or soften the latter by any direct application of heat.

An object of the present invention is to provide a lead press having means whereby such a slug may be quickly, easily and economically softened or melted for amalgamation with a new charge of metal.

In one embodiment of the invention, a lead press such as is used for sheathing electrical conductor cables may be provided, around the bottom periphery of its extrusion cylinder, with a multi-turn coil of electrical conductor embedded within the walls of the cylinder adjacent the inner periphery of the cylinder, by means of which a slug of frozen alloy in the cylinder may be softened or melted by heat generated by induction in the slug by means of a high frequency alternating current passed through the core.

Other objects and features of the invention will appear from the following detailed description of one embodiment thereof taken in connection with the accompanying drawing, in which the same reference numerals are applied to identical parts in the several figures and in which

Fig. 1 is a partly diagrammatic view in rear elevation of a lead press for sheathing electrical conductor cable and constructed in accordance with the invention;

Fig. 2 is an enlarged broken sectional view on the line 2—2 of Fig. 1; and

Fig. 3 is a still further enlarged detail of a portion of the showing of Fig. 2.

The embodiment of the invention herein disclosed comprises a lead press, generally of well known construction and mode of operation, which has a frame comprising vertical pillars 21 and 22 and horizontal cross beams 23 and 24 supported in any suitable fashion. On the upper cross beam 23 is rigidly secured a stationary ram 25. The lower cross beam 24 is rigidly mounted on or secured to a hydraulic cylinder 26 upon the ram 27 of which is mounted a die block 28, and upon the die block rests an extrusion cylinder 29. A cable core 30, to be sheathed with lead or other suitable material by the action of the machine, enters the die block from the rear through a centrally bored lock nut 31 and passes through the die block in the direction of the arrow shown in Fig. 1. The nut 31 serves to secure a tubular core-guide 32 in place within the die block 28. When the die block and the cylinder are lifted by the hydraulic ram 27 the ram 25 enters the extrusion chamber 33 of the cylinder 29 and forces the alloy contained therein down through the chamber 34 of the die block 28, and forms the alloy as a seamless sheath 35 about the cable core 30 as the latter passes through the die proper 36 and emerges through the perforated nut 37. In ordinary working the ram 25 enters the chamber 33 only so far as the dotted line 38 in Fig. 2, which dotted line therefore represents the upper surface of a slug of alloy 39 which is left behind in the chamber 33 when the cylinder 29 is again retired downwardly from the ram 25 in order that chamber 33 may be refilled with alloy for the next extrusion stroke of the press.

At the end of the day's work or other working period, the press will ordinarily be left with its parts in the position shown in Fig. 1 and with a

slug 39 of sheath metal or alloy at the bottom of the chamber 33. Ordinarily when work is to be recommenced the slug 39 will have chilled and hardened beyond the point at which its upper surface will amalgamate properly with a fresh supply of molten alloy poured into the chamber 33. Hence in the present invention a ring 40 is positioned within a corresponding recess formed in the wall of the cylinder 29 at the bottom end of the chamber and surrounding that part of the slug 39 which lies within the chamber 33. The inner periphery 41 of the ring 40 is preferably formed to be a smooth continuation of the wall of the chamber 33. The outer periphery of the ring 40 is formed with a peripheral recess or groove 42 within which is positioned a suitable number of turns of an electrical conductor to form an induction coil capable of performing the function hereinafter described.

It may be noted, incidentally, that presses of the type generally described above are ordinarily intended to be used for sheathing cable cores of a considerable variety of diameters. Hence the core block 28 is made to be interchangeable for similar blocks whose nuts 31 and 37 and core-guide 32 are adapted for other diameters of core and thicknesses of sheath; and, for convenience in making such interchanges and in manufacturing suitable die blocks, the block 28 is provided with a packing ring 44, so that the diameter of that part of the die block which projects up into the chamber 33 need not be accurately dimensioned as this can be more easily achieved by grinding or otherwise accurately forming the outer periphery of the packing ring 44.

At some convenient point in the bottom end of the cylinder 29 a radial recess 45 may be cut, to communicate with the groove 42, through which the terminals 46 and 47 of the coil 43 may be brought out for connection to a suitable source 48 of electrical power.

If at any time upon the commencement of the operation of the apparatus there is a frozen slug 39 present in the extrusion chamber, by passing an alternating electric current of suitable frequency and potential through the coil 43 an alternating electromagnetic field will be set up, principally in the upper part of the slug 39. The eddy currents thus set up within the material of the slug will rapidly and controllably heat the latter to whatever temperature is necessary to render the material of the slug able to unite with fresh material poured into the cylinder 29. Since the field thus created by the coil 43 exists substantially entirely within the material of the slug 39, because of the location of the coil substantially at the inner surface of the cylinder wall, practically no energy will be wasted in heating parts of the press, the amount of energy absorbed by the ring 40 being relatively negligible.

Although the invention has been illustrated as embodied in a lead extrusion press of a particular type and for a specific purpose the invention is by no means so limited, and is limited as to scope and spirit solely by the appended claims.

What is claimed is:

1. In an extrusion press having an extrusion cylinder, means to create an alternating electrical field within the chamber of the cylinder near the extrusion end of the cylinder, the said means comprising an electrical conductor coil embedded within the annular wall of the cylinder at the extrusion end thereof and substantially at the inner surface of the wall, there being a minimum thickness of chamber wall between the coil and the chamber.

2. In an extrusion press, an extrusion cylinder formed with a chamber and an annular recess in the inner wall of the chamber at the extrusion end thereof, and an electrical conductor coil housed in the recess and surrounding the extrusion end of the chamber, there being a minimum thickness of chamber wall between the coil and the chamber.

3. In an extrusion press, an extrusion cylinder formed wtih a chamber and an annular recess in the inner wall of the chamber at the extrusion end thereof, a guard ring positioned in the recess, and an electrical conductor coil housed in the recess between the guard ring and the cylinder wall and surrounding the extrusion end of the chamber, there being a minimum thickness of the guard ring between the coil and the chamber.

4. An extrusion press having an extrusion cylinder and means to create an alternating electrical field within the chamber of the cylinder, the said means comprising an electrical conductor coil surrounding the said chamber and embedded within the walls of the chamber at the extrusion end of the chamber and closely adjacent to the surface of the chamber.

5. An extrusion press having an extrusion cylinder and means to create an alternating electrical field within the chamber of the cylinder, the said means comprising an electrical conductor coil surrounding the said chamber and embedded within the walls of the chamber at the extrusion end of the chamber and closely adjacent to the surface of the chamber, in combination with a source of alternating electrical current.

AENEAS J. N. DUCLOS.