United States Patent

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[54] **APPARATUS FOR APPLYING FITTINGS TO STRAND ENDS**
4 Claims, 6 Drawing Figs.

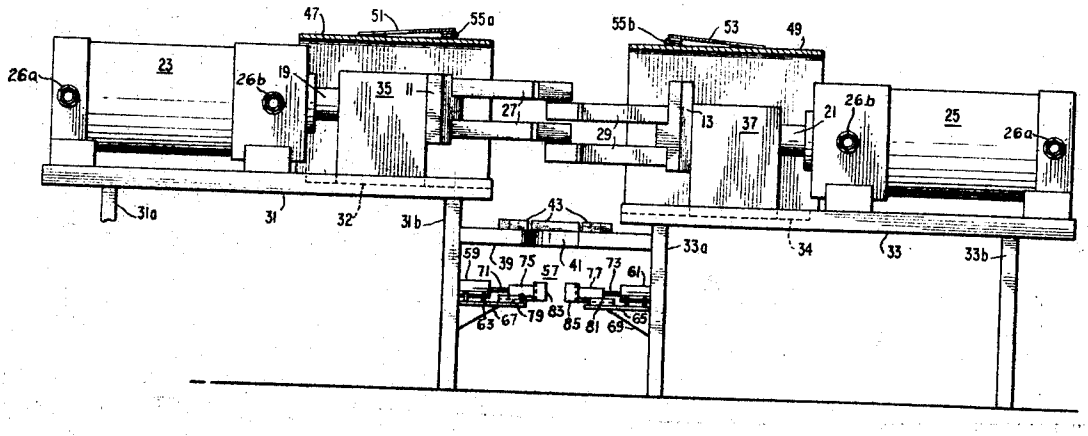
[52] **U.S. Cl.** **140/113,**
29/461, 29/527.5, 140/111, 140/147
[51] **Int. Cl.** **B21f 15/02**
[50] **Field of Search** 29/527.5,
461; 140/111, 113, 147

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ABSTRACT: Opposed dies having diverging intercalated or interlocking fingers extending from their faces are arranged for movement toward and away from each other under the influence of pneumatic pistons. A broomed end of a strand having a clamp secured a predetermined distance from the end is positioned vertically between the dies so that as the dies move toward each other the broomed ends of the wires are bundled together into pseudo strand form by the intercalated fingers and then held by the dies while an end fitting is slipped over the end of the strand. The dies are then opened and the fitting is slid down over the strand to rest upon the face of the clamp in predetermined alignment for securing to the strand.



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SHEET 1 OF 2

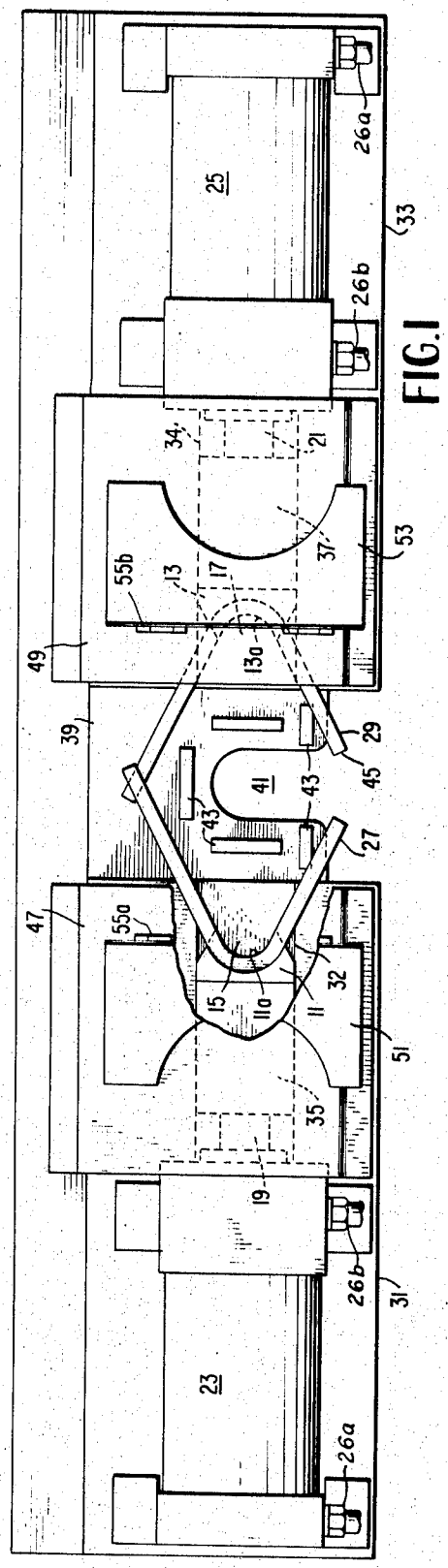


FIG. 1

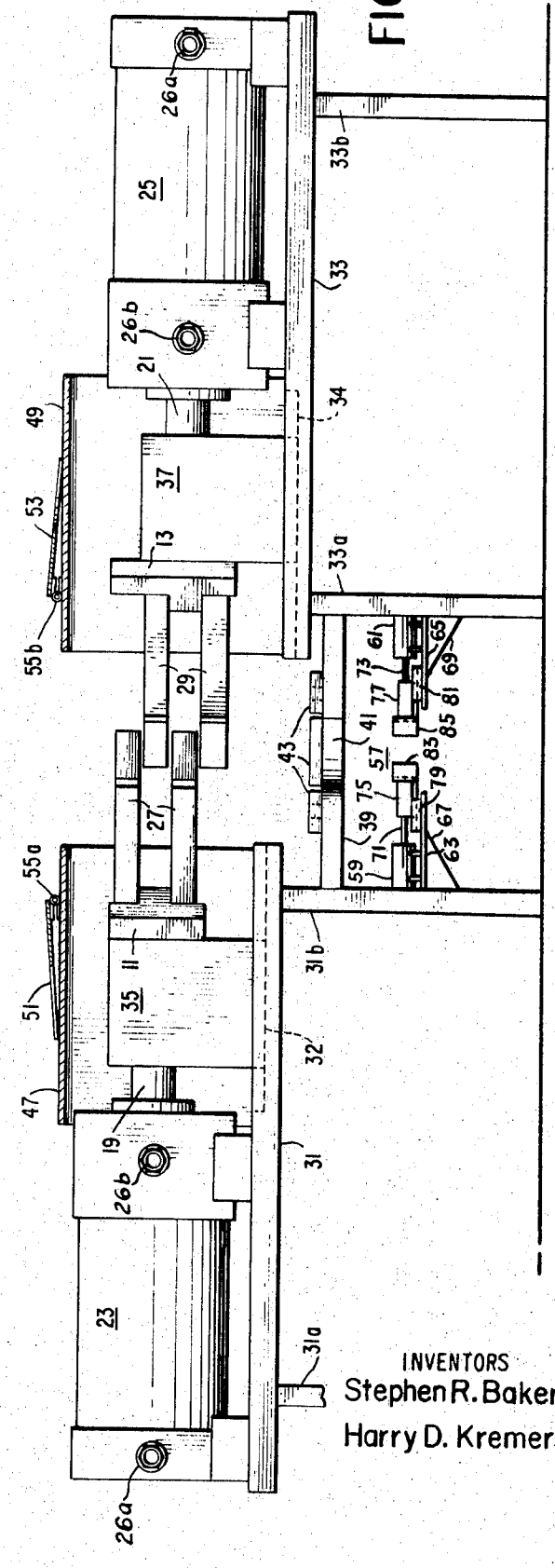


FIG. 2

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FIG. 3

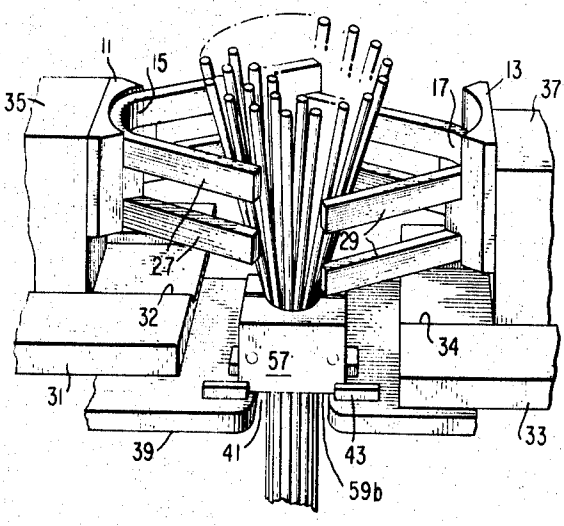


FIG. 4

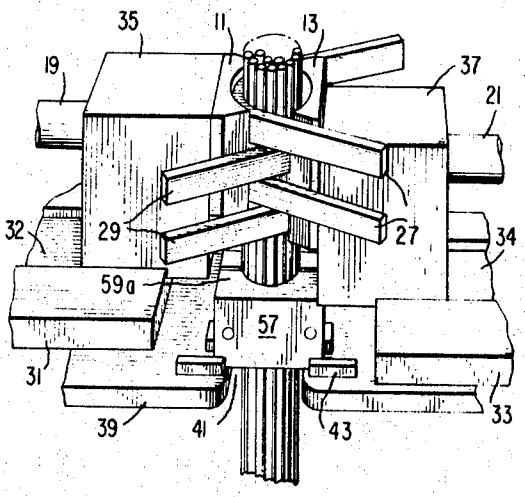


FIG. 5

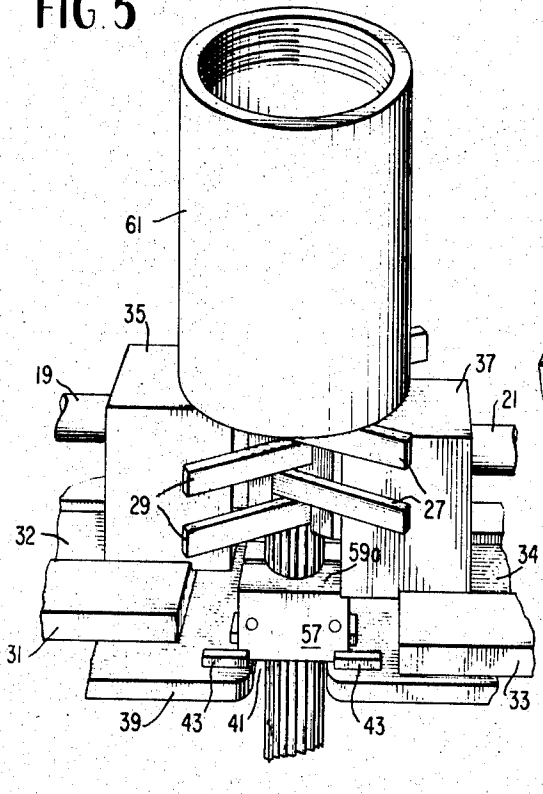
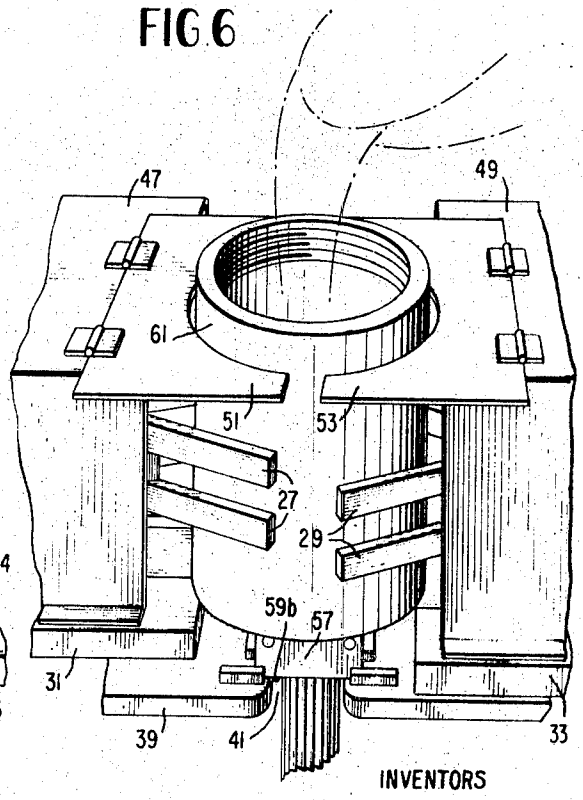


FIG. 6



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APPARATUS FOR APPLYING FITTINGS TO STRAND ENDS

BACKGROUND OF THE INVENTION

This invention relates to debrooming of the ends of wire strands to facilitate the application of end fittings and to the precise alignment of molten metal sockets on strand ends.

In the application of end fittings to strands it is frequently desirable to broom or spread out the wires of the end of the strand to facilitate cleaning of the wires and also in the case of hot metal socket-type fittings to obtain an intimate bond between the individual wires and the solidified soft metal filling the bowl of the fitting. In order to place the socket over the ends of the broomed wires it has been the custom in the case of hot metal sockets to apply the socket to the strand before brooming the end of the strand and subsequently slide the bowl of the socket back over the broomed end. Alternatively serving wire has been wrapped around the strand and then progressively forced over the broomed sections of the wires by blows from a hammer to gather the broomed wires together. In the case of parallel wire strand it is necessary to continuously clamp the strand near the end to maintain the individual wires in position until the socket is secured, and the clamp interferes with sliding a socket over the strand prior to brooming. Hammering serving wire over the broomed ends to debroom them is slow and tedious, however.

It has also been customary in applying hot metal socket-type tension fittings to the end of wire strands to clamp the end of the strand vertically and then after placing the fitting in approximate position over the end of the strand to align the fitting exactly with the end of the strand with a plumb bob or similar leveling means prior to pouring hot metal into the bowl of the socket. If the socket fitting was not plumbed prior to pouring in the hot metal it would frequently become affixed to the strand and in a slightly cocked position whereby later tension on the fitting would not be evenly distributed to the wires of the strand. Plumbing the socket, however, is tedious and expensive.

SUMMARY OF THE INVENTION

The present invention provides a machine which can quickly and efficiently debroom the end of a strand by means of reciprocating dies having diverging intercalated fingers extending from the faces to gather the broomed ends of the wires and guide them into the die cavities as the dies are closed by suitable power means so that the wires are clamped in the die cavities in pseudo strand form while an end fitting or the like is placed over them.

The present invention also provides a method of aligning a hot metal socket fitting on the end of a strand by first applying a clamp designed to exactly fit around the strand and having a planar face disposed at right angles to the longitudinal axis of the clamp, positioning the strand end in a vertical position, and positioning the lower edge of the socket against the face of the clamp to align the socket with the end of the strand.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the apparatus of the invention.

FIG. 2 is an elevation of the apparatus.

FIG. 3 shows a detail of a broomed end of a parallel wire strand inserted between the dies of the invention.

FIG. 4 shows a detail of the die closed to debroom the end.

FIG. 5 shows a detail of a socket placed over the end of the strand.

FIG. 6 shows a detail of the dies open to allow the socket to be positioned for the application of hot metal.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIGS. 1 and 2 are shown opposed dies 11 and 13 operatively connected to piston rods 19 and 21 extending from

pneumatic cylinders 23 and 25. Dies 11 and 13 have faces 11*a* and 13*a* with arcuate impressions 15 and 17 therein. When dies 11 and 13 are brought together by pneumatic pressure applied to cylinders 23 and 25, arcuate impressions 15 and 17 cooperate to form a cylindrical die cavity of substantially the outer dimensions of a strand the end of which is to be debroomed. Diverging intercalated fingers 27 and 29 extend from the faces of dies 11 and 13 respectively. These intercalated fingers at their widest divergence are at least as far apart as the width of the debroomed ends of the strand wires and in the embodiment shown at least as wide as the outside dimensions of the socket to be applied to the end of the strand. For convenience of construction fingers 27 and 29 may be embedded in the faces of dies 11 and 13 flush with the die faces 11*a* and 13*a* and forming a portion of such faces.

Cylinders 23 and 25 are supported on stationary supporting means 31 and 33 having supporting legs 31*a* and 31*b* and 33*a* and 33*b*. Piston rods 19 and 21 are directly connected to support bearing pieces 35 and 37 respectively movably mounted in slides 32 and 34 upon stationary supporting means 31 and 33. The pistons, not shown, within cylinders 23 and 25 are double-acting pistons adapted to be moved in either direction by any suitable manual pneumatic control system which applies air pressure through pneumatic connections 26*a* and 26*b* to the back or front faces of both pistons simultaneously so that the dies 11 and 13 supported by bearing pieces 35 and 37 may be actively moved together or apart at the will of the operator. In the embodiment shown stationary supporting means 31 is slightly higher than stationary supporting means 33 to facilitate intercalation of fingers 27 and 29. While this arrangement provides convenience in fabrication because of duplication of parts, other arrangements could also be used.

Between stationary supporting means 31 and 33 and secured to mounting legs 31*b* and 33*a* is mounted an accurately leveled alignment plate 39 having a slot 41 large enough to accommodate a strand of the diameter to be debroomed. A series of clamp positioning stops 43 are welded in a rectangular pattern on top of alignment plate 39 about slot 41. Preferably the ends of fingers 27 and 29 extending over slot 41 are made shorter as seen at 45 than the fingers on the opposite side to allow the strand to be slipped between the two sets of intercalating fingers without opening the dies 11 and 13 to their extreme positions. Sheet metal shields 47 and 49 are preferably mounted over support bearing pieces 35 and 37, and slides 32 and 34. Small cooperating shields 51 and 53 with adjacent arcuate cut out portions are hinged at 55*a* and 55*b* on top of shields 47 and 49.

A pneumatic clamping means 57 is preferably mounted under alignment plate 39 to grasp the strand and prevent it from rising up as the dies 11 and 13 close on the broomed wires at the end of the strand. Small pneumatic cylinders 59 and 61 are mounted on supporting plates 63 and 65 attached to legs 31*b* and 33*a* by means of brackets 67 and 69. Pistons 71 and 73 are connected to V-guides 75 and 77 sliding in V-beds 79 and 81 mounted on support plates 63 and 65. Clamping jaws 83 and 85 are supported on the ends of V-guides 75 and 77 in position to clamp a strand in the apparatus and prevent it from moving. Other suitable clamping arrangements may, of course, also be used.

When applying molten metal sockets to the end of a parallel wire strand a clamp 57 having planar end faces 59*a* and 59*b* at right angles to the longitudinal axis of the clamp is applied to the strand with the upper or outer face 59*a* at a predetermined location previously marked on the strand to which position the end of the socket is to extend in the finished strand. The wires at the end of the strand having been broomed outwardly in any suitable manner, such as by inserting a small pipe over the wires and bending them outwardly, and then cleaned, the end of the strand is inserted into slot 41 from the side with the broomed end extending vertically upwardly between fingers 27 and 29 and the clamp 57 aligned between positioning stops 43 with its lower surface 59*b* contacting the upper face of alignment plate 39 as seen in FIG. 3. The jaws 83 and 85 of

clamping means **57** are next closed to secure the strand in position by admitting air to pneumatic cylinders **59** and **61**. Air is then admitted through pneumatic connections **26***a* to the rear of cylinders **23** and **25** to force dies **11** and **13** towards each other. As dies **11** and **13** move towards each other fingers **27** and **29** cooperate to progressively bundle the broomed ends of the wires together again into at least pseudo strand form as shown in FIG. **4**. A hot metal socket **61** is then placed over the bundled ends of the wires as shown in FIG. **5** after which the dies **11** and **13** are opened by the application of air pressure through pneumatic connections **26***b* to the forward ends of cylinders **23** and **25** so that socket **61** may fall or be forced down over the wires of the strand until its lower end rests on top of the clamp **57** with the flat face **59***a* of the clamp acting as both a positioning stop and a hot metal dam as shown in FIG. **6**. Since the lower face **59***b* of clamp **57** rests on the leveled upper surface of alignment plate **39** and faces **59***a* and **59***b* are parallel to each other and at right angles to the longitudinal axis of the strand, if the lower end of the socket **61** is flat and at right angles to the longitudinal axis of the socket the longitudinal axis of the socket is automatically aligned with the longitudinal axis of the strand. The small shields **51** and **53** are then folded down as seen in FIG. **6** over the fingers, dies and slides to protect these parts from splashing hot metal, and molten zinc metal is poured into the upper end of the socket to solidify around the broomed ends of the wires, which spring out again inside the socket **61** after dies **11** and **13** are opened and the socket is pushed down against clamp **57** preparatory to filling the socket with hot metal. After the zinc has solidified in the socket clamping means **57** is opened and the strand is removed from slot **41** whereupon it will be found that the socket is precisely aligned and positioned on the end of the strand.

We claim:

1. An apparatus for applying fittings to broomed ends of wire strand comprising:

a. slotted positioning means;

b. stationary support means on opposite sides of said slotted positioning means;

c. first and second cooperating opposed die means respectively mounted upon said stationary support means for relative movement toward and away from each other adjacent the slotted positioning means;

d. said die means when brought into substantially abutting position delineating between them a die cavity at least a portion of which conforms substantially to the outside normal cross-sectional dimensions of a wire strand upon which a fitting is to be mounted;

e. at least two diverging fingers extending at an angle from each said die means;

f. the fingers extending from said first die means overlapping the fingers extending from said second die means in an intercalated relationship, the distance between the outer ends of said fingers of each die means being at least equal to the widest brooming of the broomed end of said strand, said fingers of each die means being positioned to extend past the opposing die means when said die means are brought into abutting position; and

g. prime mover means to move said die means towards and away from each other.

2. An apparatus according to claim **1** additionally comprising clamp means adjacent said slotted positioning means to secure said strand during the movement of said die means.

3. The apparatus of claim **1** wherein said slotted positioning means has an upper surface at least a portion of which is substantially level and said cavity delineated by said die means is substantially vertically oriented.

4. The apparatus of claim **3** additionally comprising clamp means under said slotted positioning means to secure said strand during movement of said die means.