

[54] CRIMPING MACHINE

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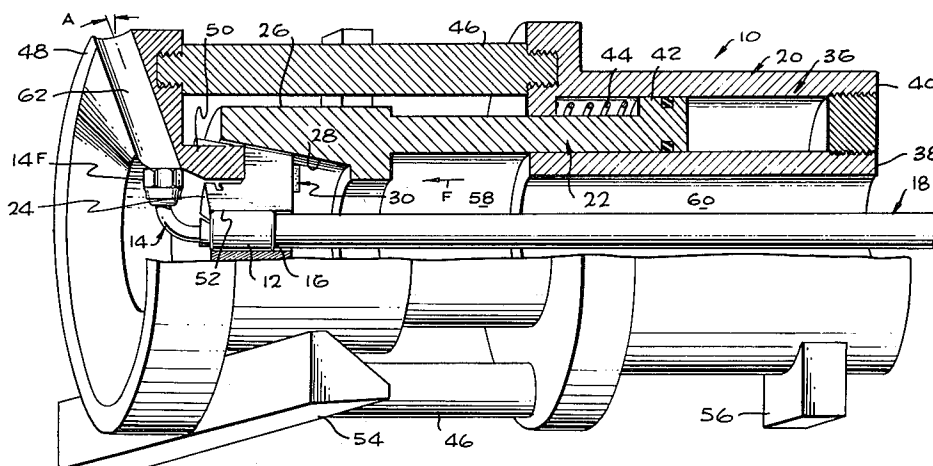
3,217,519	11/1965	Demler	81/304 X
3,234,776	2/1966	Stoltz	72/452 X
3,335,594	8/1967	Peterman et al.....	29/508 X
3,568,494	3/1971	Geisman	29/237 X

3,805,580 4/1974 Leiker..... 29/237 X

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[57] **ABSTRACT**

Apparatus for crimping a fitting onto a hose or the like, which readily accomodates gooseneck fittings. The apparatus includes a ram with a slideable piston for moving a set of crimping dies together, wherein the piston has a central passageway extending along its entire length so that a hose can be moved into the back end of the machine and passed along almost the entire length of the machine up to the crimping dies, and a fitting can be installed onto the hose end while most of the fitting extends forward of the dies. The ram is then operated to move the piston so that the dies are forced together to crimp the fitting onto the hose.

5 Claims, 3 Drawing Figures

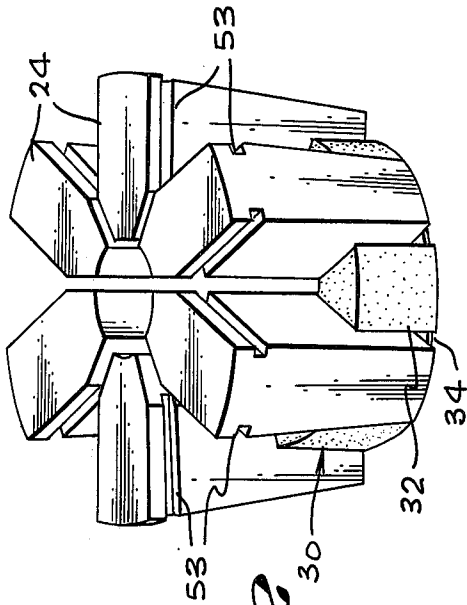
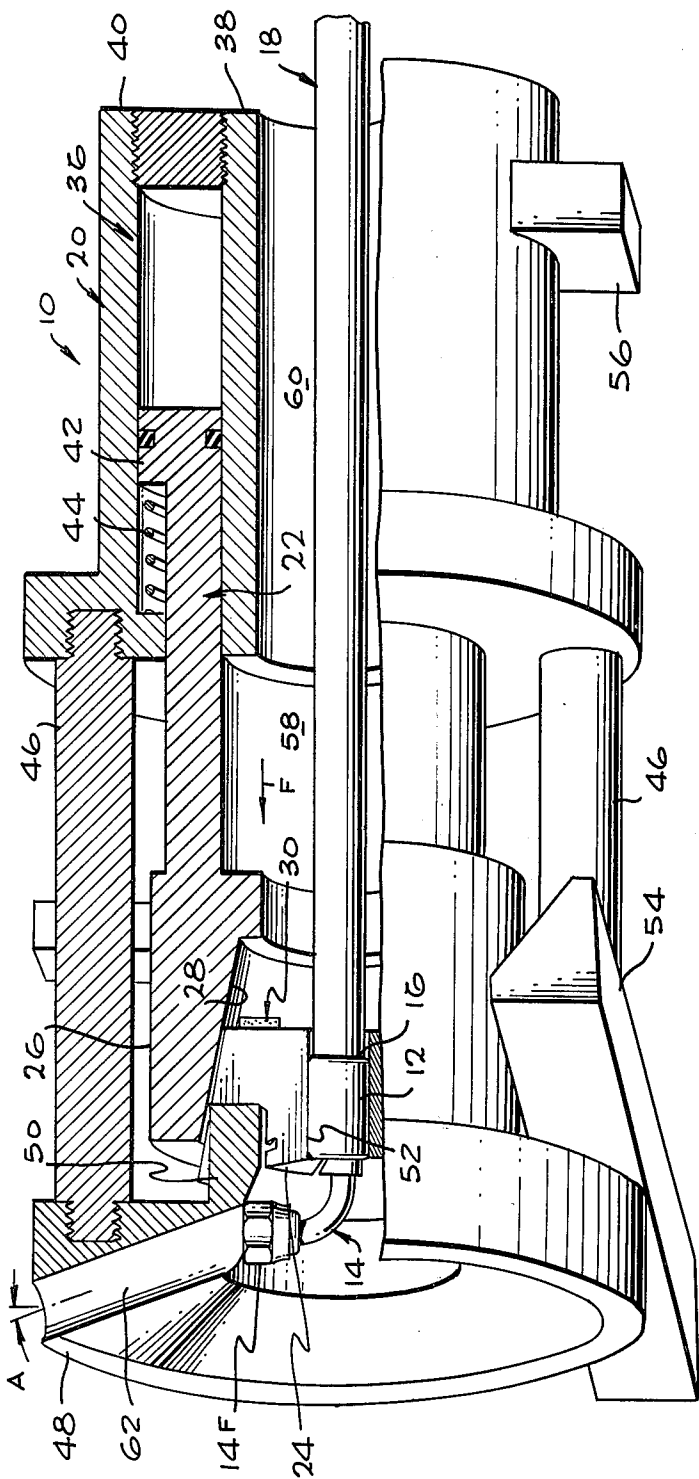


Fig. 1

Fig. 2

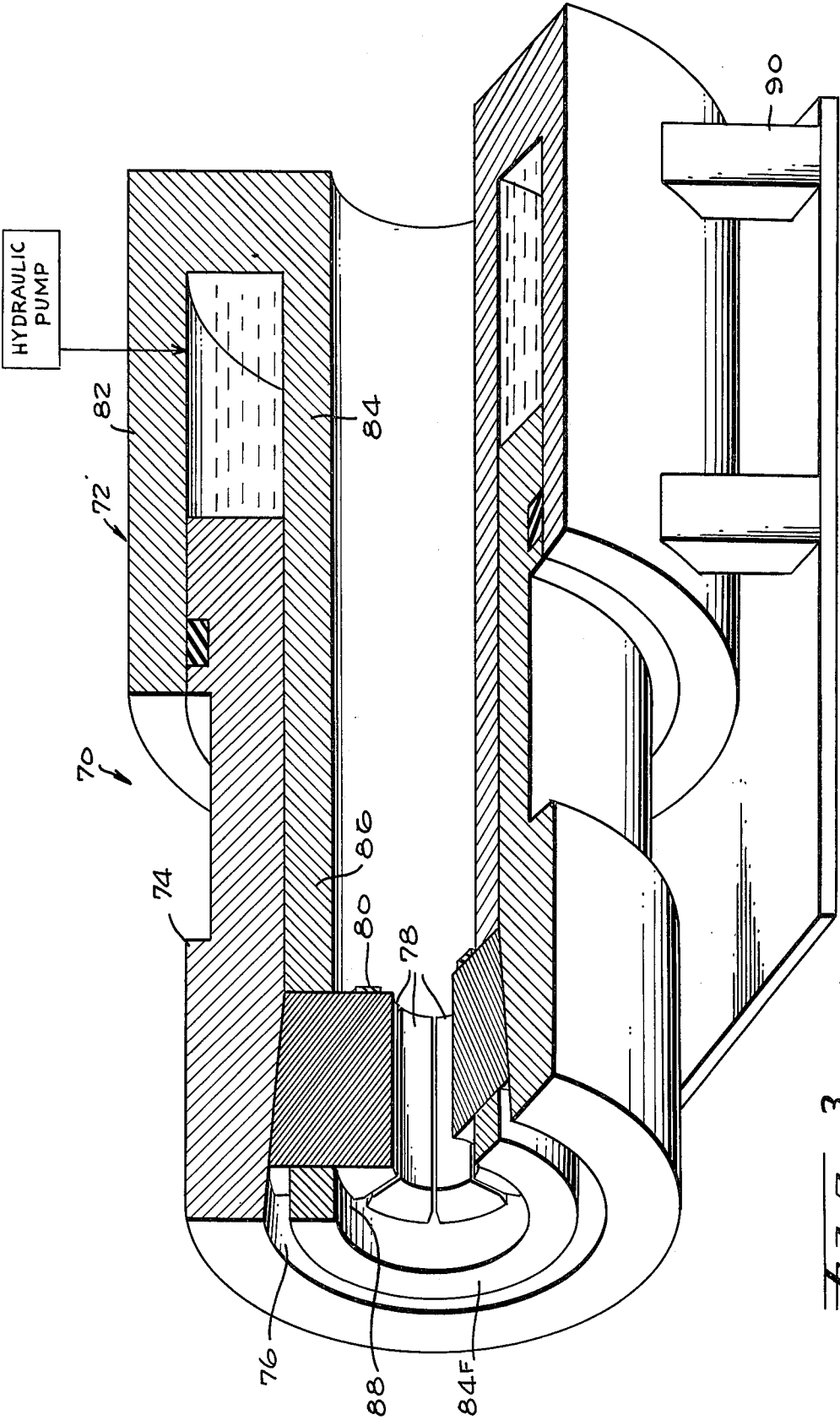


Fig. 3

CRIMPING MACHINE

BACKGROUND OF THE INVENTION

This invention relates to crimping apparatus.

Hose fittings can be permanently attached to a hose in the field or in a small production shop by the use of a small crimping or swagging machine. Such a machine typically includes several crimping dies that can be forced together around the fitting by a piston of a ram. The ram may include a cylindrical hydraulic cylinder and a solid piston moveable vertically in the cylinder and having camming surfaces at its upper end that engage the dies to move them together when the piston is forced up. A workman can attach a fitting to a hose by first inserting the fitting into the machine so that the inner end of the fitting, which is to be crimped onto the hose, lies within the crimping dies and the hose extends upwardly therefrom. He then operates the ram to force the dies together about the fitting to crimp it to the hose.

The fact that the fitting must be inserted almost completely into the crimping machine limits the versatility of the machine. An angle or gooseneck fitting often cannot be crimped because the angled part cannot be accommodated within the machine. Also, the fact that the operator cannot grasp any of the heavy fitting and the fact that crimping often occurs deep within the machine, means that it is often inconvenient to perform the crimping operation.

SUMMARY OF THE INVENTION

In accordance with one embodiment of the present invention, a crimping machine is provided which enables crimping of a wide variety of fitting types including the angled types, and which permits an operator to gain a better view of the crimping operation as it proceeds. The machine includes a ram with a slideable piston for moving a group of crimping dies together, wherein the piston has a central passageway extending along its entire length. The hollow piston can receive a long hose length, so that most of the fitting to be crimped can extend out of the front of the machine. As a result, a fitting with an angled portion which could not be readily accommodated within the crimping machine can be readily crimped because the angled portion extends out of the machine. In a machine with a hydraulic ram, the rearward end of the piston is of ring-like or annular shape and closely slides within a hydraulic "cylinder" that is also of annular shape to form a hole along its center through which the hose extends.

The novel features that are considered characteristic of this invention are set forth with particularity in the appended claims. The invention will best be understood from the following description when read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially sectional perspective view of a crimping machine constructed in accordance with the present invention, showing how it is utilized to crimp a fitting onto a hose;

FIG. 2 is a perspective view of the crimping dies of the machine of FIG. 1; and

FIG. 3 is a partially sectional perspective view of a crimping machine constructed in accordance with another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a crimping machine 10 which is utilized to crimp an end 12 of a fitting 14 onto an end 16 of a hose 18. The machine includes a ram 20 with an elongated piston 22 which slides along its length to move a set of crimping dies 24 against the fitting end 12 to crimp the fitting onto the hose. The piston 22 has a forward end 26 which is tapered at its inside to form a camming surface 28. The camming surface 28 engages the outside of the crimping dies 24 so that when the piston 22 is moved in a forward direction, as indicated by the arrow F, the dies are moved radially inwardly. A separator 30 which moves the dies apart when the piston is moved rearwardly, is constructed of elastomeric material and includes segments 32 (FIG. 2) located between adjacent crimping dies and tied together by a retainer 34.

The ram 20 is of a hydraulic type, that is, it is operated by a pressurized fluid which may be a liquid such as oil, or a gas such as air. The ram includes a hydraulic "cylinder" or enclosure 36 formed by an inner tubular member 38 and an outer tubular member 40 which is concentric with the inner member. The rearward end 42 of the piston is closely received in the hydraulic cylinder so that when pressurized fluid is applied to the cylinder through a pump and fitting (not shown) the piston is forced in the forward direction to perform a crimping operation. A spring 44 is also provided which returns the piston to its rearward position when hydraulic pressure is removed. The outer tubular member 40 is connected through three rods 46 to a front member 48 which lies at the front of the machine. The front member 48 has a rearwardly extending guide portion 50 which has radially-extending slots or guideways 52 that guide the crimping dies in radial movement against a fitting. The guide portion 50 also prevents axial movement of the crimping dies, the walls of the guideways (or keys therein) projecting into radial slots 53 of the dies to prevent rearward axial movement of the dies. A pair of mounts 54, 56 are designed to support the machine on a table with the piston 22 extending horizontally.

Both the piston 22 and ram 36 have central passageways 58, 60 extending along their entire length. These passageways 58, 60 permit the projection of the hose 18 through most of the length of the machine up to the crimping dies, so that the fitting 14 can be inserted into the front end of the machine and with most of the fitting lying in front of the crimping dies 24. As a result, an angular or gooseneck fitting, such as that shown at 14 in FIG. 1, can be readily accommodated since the angled portion of the fitting lies in front of the machine. This may be contrasted with prior crimping machines which did not have a central passageway extending throughout their length so that the long hose had to extend in front of the machine and the fitting had to lie entirely within the crimping machine, and wherein a goose-neck fitting could not be readily accommodated. The present machine not only allows gooseneck or other fittings with angled or large ends to be accommodated, but also facilitates the crimping operation even in the case of ordinary fittings, because most of the fitting lies outside of the machine where it can be readily held or manipulated by the workmen.

In the case of some gooseneck fittings which are sharply angled, interference may sometimes occur between the front member 48 and the angled portion of the fitting. In order to accommodate such fittings, the front member 48 is provided with a deep groove 62 that extends primarily radially, and at a slight forward angle A away from the radial direction. The groove 62 accommodates the forward end 14F of the angled fitting without unduly weakening the forward member 48. It may be noted that the groove 62 lies along the same position as one of the rods 46 which connects the front member 48 to the outer tubular member 40 of the ram, so that the rod 46 can directly transmit forces to portions of the front member on either side of the groove and little force must be transmitted directly through the grooved portion of the front plate. The angling of the groove 62 at the angle A results in it being able to accommodate the rearward ends of gooseneck fittings of a variety of sizes, the larger sizes projecting a greater distance in front of the dies but extending a greater radial distance out from the center of the machine.

FIG. 3 illustrates another crimping machine 70 which enables further simplification of construction and which accommodates an even greater variety of fitting types. The machine 70 includes a hydraulic ram 72 with a piston 74 that has a front camming surface 76, and a group of crimping dies 78 that are moved together by the piston and which are moved apart by a separator 80. The ram has a hydraulic cylinder of annular shape which includes an outer tubular wall 82 and an inner tubular wall 84 that form an annular space between them through which the annular piston can slide. In accordance with this embodiment of the invention, the inner wall 84 has a forwardly extending portion 86 which forms the guideways 88 through which the crimping dies 78 move.

The provision of the forward extension 86 on the inner wall of the annular hydraulic cylinder results in considerable simplification of construction. Specifically, this eliminates the need for rods or the like to extend forwardly from the outer portion of the ram to the front of the machine and a front member with a rearward extension to form the guideways for the dies. Instead, the inner wall 84 of the cylinder is merely formed longer and formed with radial guideways 88. An important additional advantage of this construction is that the front end 84F of the tubular inner member 84 extends only a short distance in front of the crimping dies 78. It is even possible to have the tubular member extend only as far as the crimping dies if other provisions are made to prevent forward axial movement of the dies as by providing slots similar to slots 53 in the dies of FIG. 2. In any case, the short projection of the front end 84F forward of the crimping dies means that a gooseneck fitting or other fitting with an awkward forward end can be readily accommodated without the need for special grooves or the like. Also, a workman can more easily view the crimping region. It may be noted that the machine 70 of FIG. 3 is also provided with a mount 90 which holds the machine so the passageways in the inner tubular member 84 and piston 74 extend horizontally. Both the machine of FIG. 3, as well as the machine of FIG. 1, preferably extend horizontally to facilitate the insertion of a long length of hose through the machine.

A workman can crimp a fitting onto a hose by projecting the hose through the central aperture of the ma-

chine up to the crimping dies, inserting a fitting into the machine so that its end surrounds the hose at the crimping dies, and then operating the ram to move the dies together and crimp the fitting thereon. In most cases, the fitting and hose assembly can be moved either forwardly or rearwardly out of the machine. Where the hose is of a long length and the fitting is not too large, a rearward removal is most convenient, and this is accomplished by pulling the hose so the fitting moves rearwardly through the entire length of the machine and out through the rearward end.

Thus, the invention provides a crimping machine which facilitates the crimping of a fitting onto a member. The device is useful not only to crimp a fitting onto a hose, but also onto a cable or other similar element. The machine facilitates such operations by providing a piston with a passageway extending through its entire length, so that the hose or other member can project through nearly the entire length of the machine while the fitting projects only partially into the machine and most of the fitting lies in front of the dies of the machine.

Although particular embodiments of the invention have been described and illustrated herein, it is recognized the modifications and variations may readily occur to those skilled in the art and consequently it is intended that the claims be interpreted to cover such modifications and equivalents.

What is claimed is:

1. Apparatus for crimping a fitting onto an elongated member, comprising:

ram means with a longitudinally movable piston having forward and rearward ends, said piston having a central passageway;

a plurality of crimping dies movable radially together and apart, said piston having a camming surface at its forward portion for engaging said dies to move them radially together when the piston moves longitudinally;

a mount coupled to said ram means, said mount fixing the position of said ram means with the central passageway of the piston extending horizontally; said central passageway extending along the entire length of the piston to receive said elongated member in extension therealong, and said ram means being devoid of obstructions behind the center of said passageway, whereby the elongated member can project completely through the rear of the apparatus.

2. A crimping machine comprising:

a hydraulic cylinder having concentric inner and outer tubular walls forming an annular region therebetween, said inner tubular wall having a forwardly extending portion with a plurality of radially-extending guideways;

a plurality of crimping dies radially moveable in said guideways of said inner tubular member; and

a piston of tubular shape with a rearward portion disposed in said annular region of said hydraulic cylinder between said tubular walls thereof, and having a forward portion forming a camming surface engaged with said crimping dies to move them radially along the guideways in said inner tubular wall.

3. Apparatus for crimping a fitting onto a long hose-like member, comprising:

a ram having an annular hydraulic cylinder with a hole through the center, and having a longitudi-

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nally moveable piston of annular shape to move in said cylinder;
a plurality of crimping dies moveable radially together and apart, said piston having a camming surface engaging said dies to move them radially together when the piston moves longitudinally;
said piston having a central passageway extending along its entire length to receive said long hose-like member in extension therealong, whereby the hose-like member can project through the ram portion that moves the piston and through the piston so that the end of the fitting opposite the crimped portion can project from the machine.
4. Apparatus for crimping a fitting onto a long hose-like member, comprising:
a ram with a longitudinally moveable piston;
a plurality of crimping dies moveable radially together and apart, said piston having a camming surface engaging said dies to move them radially together when the piston moves longitudinally;
said piston having a central passageway extending along its entire length to receive said long hose-like member in extension therealong, so that the hose-like member can project through the piston to allow the end of the fitting opposite the crimped portion to project from the machine;
a front member having radial guideways for guiding

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the crimping dies against a fitting; and means for holding the front member spaced in front of the ram;
said front member having a groove extending in a primarily radial direction along the front surface thereof, from the radially innermost part thereof, to receive a portion of a gooseneck fitting.
5. Apparatus for crimping a fitting onto a long hose-like member, comprising:
a ram with a longitudinally moveable piston; and
a plurality of crimping dies moveable radially together and apart, said piston having a camming surface engaging said dies to move them radially together when the piston moves longitudinally;
said piston having a central passageway extending along its entire length to receive said long hose-like member in extension therealong, whereby the hose can project through the piston so the end of the fitting opposite the crimped portion can project from the machine;
said ram including an inner tubular member with a rearward portion disposed within said piston to guide it in axial movement, said inner tubular member having a forwardly-extending portion with a plurality of radially extending guideways for guiding said crimping dies in radial movement.
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