

[54] CRIMPING DIE ARRANGEMENT

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[56] **References Cited**

UNITED STATES PATENTS

3,455,140	7/1969	Galan et al.	72/416
3,575,036	4/1971	Hoffman	72/402
1,701,250	2/1929	Young	72/403
565,257	8/1896	Boyd	72/402
2,231,278	2/1941	Miller	29/237
1,782,219	11/1930	Wallace	29/237

FOREIGN PATENTS OR APPLICATIONS

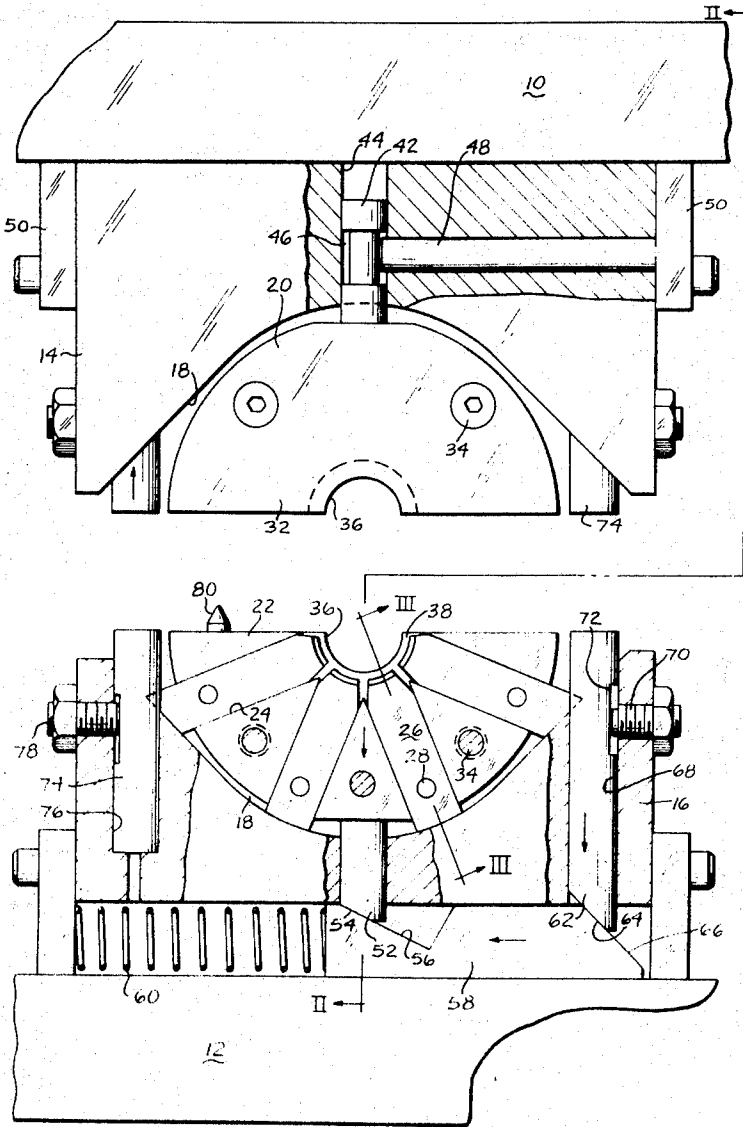
710,088 5/1965 Canada 72/402

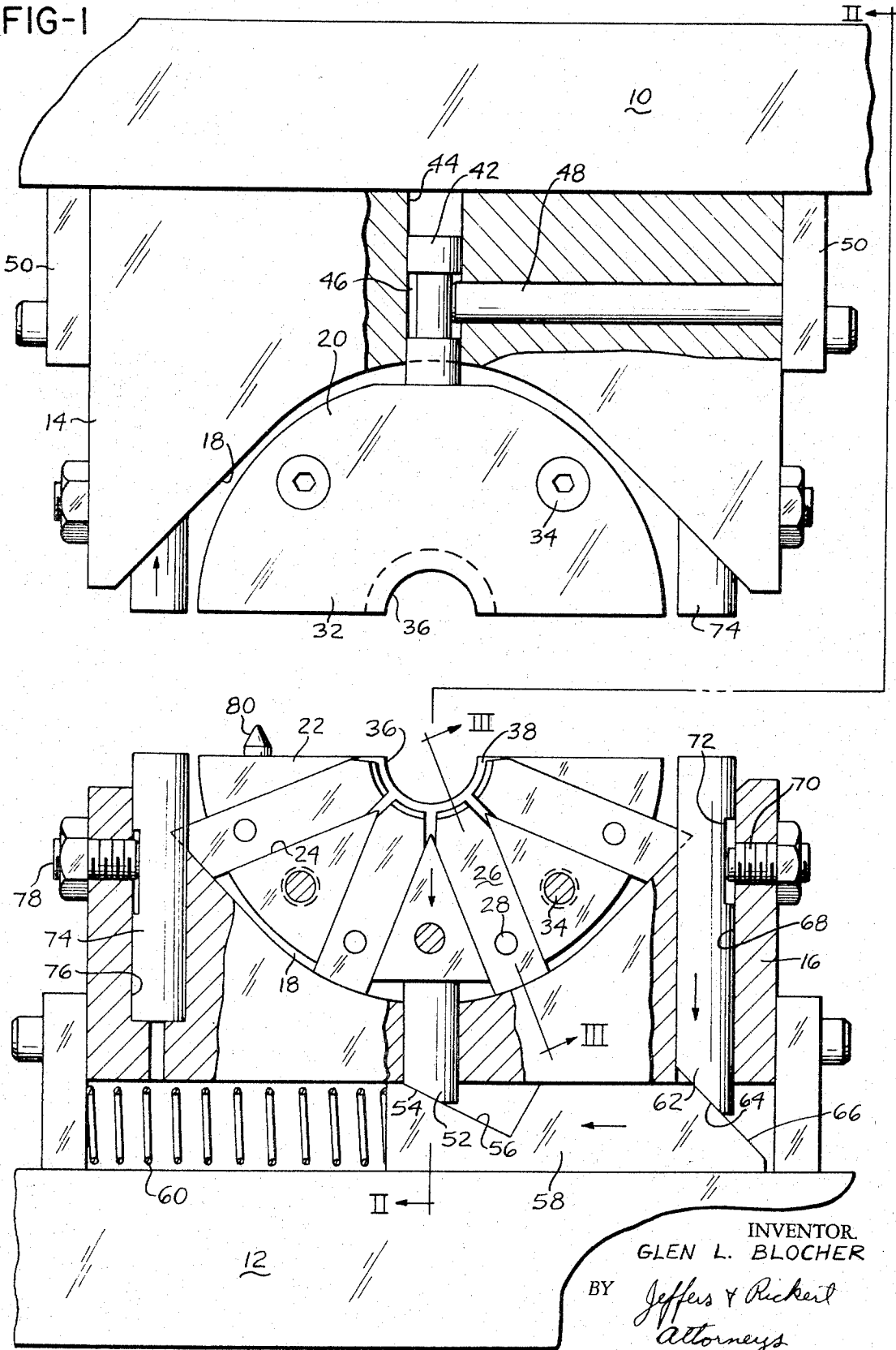
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[57] **ABSTRACT**

The specification discloses a crimping device, especially for crimping fittings on high pressure hoses and the like, in which a separable die is made up of a pair of die bodies having registering cavities to receive the fittings to be crimped. The die bodies have radially disposed crimping fingers which are all actuated inwardly toward the center of the cavity simultaneously in a positive manner, thereby to effect uniform crimping of the fitting on the hose, or the like, so that the crimped off fitting will be capable of holding high pressures and will be perfectly round in the crimped region thereof.

10 Claims, 3 Drawing Figures





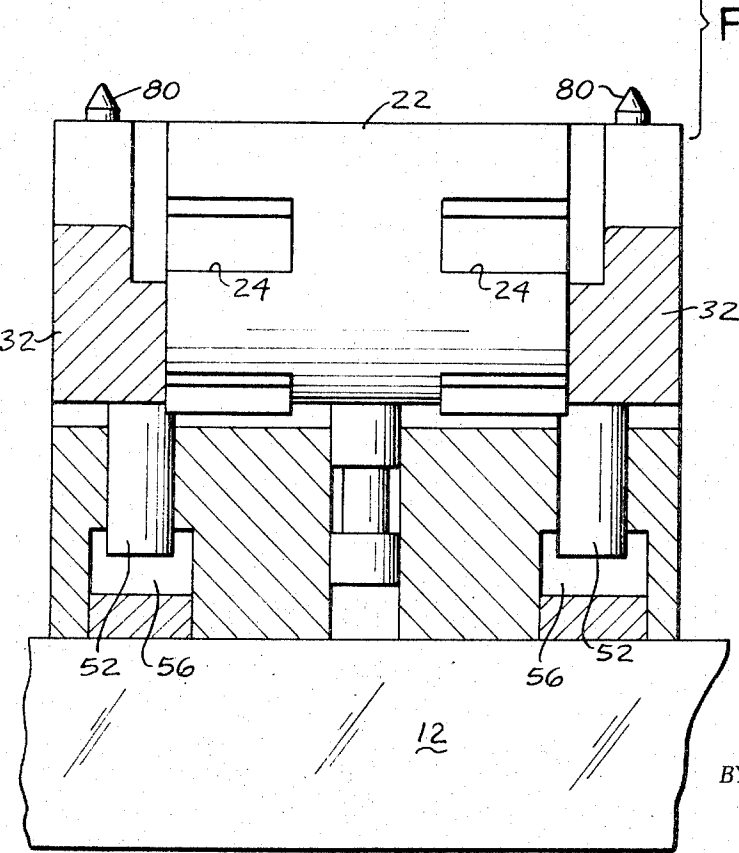
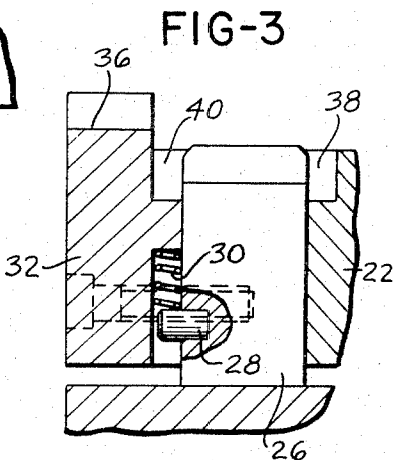
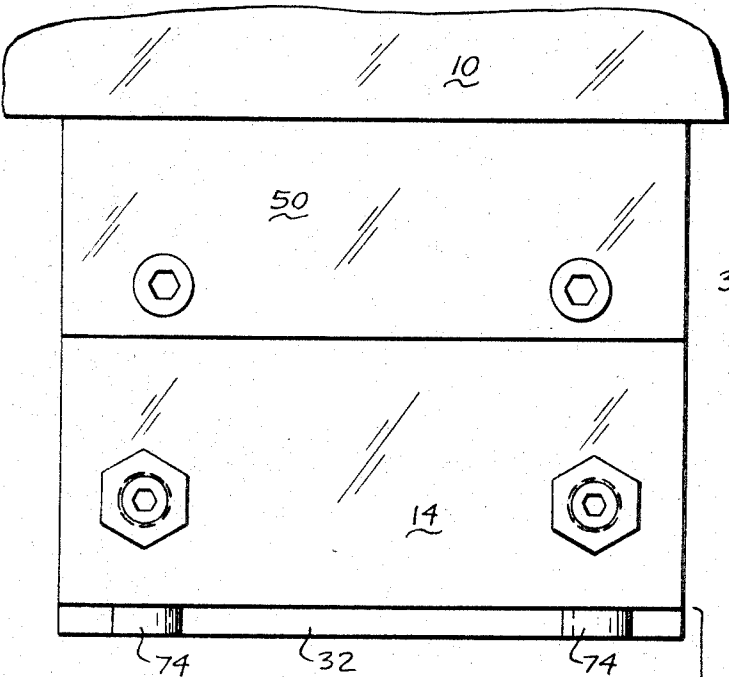


FIG-2

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CRIMPING DIE ARRANGEMENT

The present invention relates to a crimping tool, and is particularly concerned with a crimping tool which is adapted for crimping fittings on high pressure hydraulic hoses, and the like.

Crimping tools for crimping fittings on hoses, and the like, are known and, therefore, have been generally satisfactory in respect of lower pressure applications. However, when high pressures are encountered in hydraulic systems, and the like, known crimping devices have proved to be defective in that they did not always crimp the fitting uniformly about the hose and, therefore, did not provide for uniform resistance to pressure about the entire fitting.

With the foregoing in mind, a primary objective of the present invention is the provision of a crimping tool which will produce superior results when employed for crimping fittings about hoses and the like.

A still further object of the present invention is the provision of a crimping die arrangement for crimping fittings on hoses and the like which produces results such that high pressures can be contained by the thus crimped fittings without leakage.

Still another object is the provision of a crimping tool of the nature referred to in which all portions of the fitting crimped in the tool receive the same treatment.

It is also an object of the present invention to provide a crimping tool of the nature referred to in which the crimped fitting is round when it is removed from the crimping tool.

Still another object of the present invention is the provision of a crimping tool of the nature referred to which will produce superior results but which is relatively inexpensive to manufacture and to maintain.

Still another object of this invention is the provision of a crimping tool in which more than one type or size of fitting can be crimped.

The foregoing objects as well as still other objects and advantages of the present invention will become more apparent upon reference to the following detailed specification taken in connection with the accompanying drawings in which:

FIG. 1 is a side view of a crimping die arrangement according to the invention and partly in section;

FIG. 2 is a view looking in at the left side of FIG. 1 and also partly in section; and

FIG. 3 is a sectional view indicated by line III—III on FIG. 1, showing therefrom crimping fingers.

BRIEF SUMMARY OF THE INVENTION

According to the present invention, two die bodies are provided having cavity means formed therein which define at least one cavity for confining a fitting when the die bodies are closed on each other. Each die body carries a set of radial fingers adapted for being projected into each thus formed cavity for crimping a fitting in the cavity inwardly about the hose, or the like, which is in the fitting. According to the present invention, the fingers are normally radially outside the limits of the cavity means in the die blocks and are only moveable into the cavity means when the die bodies have been brought together. Each die body has associated on the side thereof opposite the other die body, an actuating member engaging the radially outer ends of the crimping fingers pertaining to the respec-

tive die body and upon the bringing together of the die bodies, the actuating members are progressively released for simultaneous movement toward the die bodies to actuate the crimping fingers radially inwardly so as to crimp a fitting in the die bodies inwardly.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings somewhat more in detail, in FIGS. 1 and 2, reference numerals 10 and 12 designate the portions of a die set in which the crimping die assembly of the present invention is adapted for being mounted with the die set including the usual guide pins and guide bushings to guide the parts of the crimping die assembly of the present invention toward and away from each other when placed in a suitable actuating device, such as a pneumatic press, or the like.

Mounted on each of the elements 10 and 12 of the die set is a first block member 14 on element 10 and block member 16 on element 12. Each of the block members is provided with a recess 18 opening toward the other and in each of the recesses 18 is a second block member 20 pertaining to block member 14 and block member 22 pertaining to block member 16. Block members 14 and 16 form actuating members and block members 20 and 22 form die bodies.

Each of the die bodies 20 and 22 is provided with a plurality of radial grooves or slots 24 formed therein extending inwardly from each end and in each of which is reciprocally mounted a respective crimping finger 26.

As will be seen in FIG. 3, each crimping finger 26 has a pin 28 mounted therein which is engaged by compression spring 30 biasing the respective crimping finger in the radial outward direction. On each end of each of the block members 22, there is mounted an end cap, or cover plate, 32, retained in position as by cap screws 34 and serving to close the outer ends of slots 26 and also grooved for containing the biasing springs 30 and providing bearings for the radially inner ends thereof.

Each of the die bodies 20, 22, and the pertaining end caps 32 are provided with a central axial cut-out or recess forming cavity means which register when the parts of the crimping die assembly are closed on each other so as to confine a fitting which is to be crimped on a hose or the like, while at the same time, locating the said hose.

For example, end caps 32 are provided with arcuate cut-outs 36 having a diameter substantially conforming to that of the hose or other element which is to be provided with a fitting. The die bodies 20 and 22, on the other hand, are recessed as indicated at 38 so that a fitting to be crimped on the hose can be placed therein. Advantageously, the recessed portion 38 in the die bodies 20, 22 exposes the radially inner ends of crimping fingers 26 so that the fitting can rest directly thereon.

As will be seen in FIG. 3, the recessed portion 38 of block 22 exposes the ends of crimping fingers 26 and also communicates with a recess 40 formed on the inside of the adjacent cover plate 32 so that a fitting to be crimped on a hose can be placed in the resulting cavity resting on the radially inner ends of crimping fingers 26 and aligned with a hose or like member extending through the cut-out portion 36 in the respective end plate.

Each die body 20, 22 is provided with at least one pin 42 extending therefrom into a bore 44 provided in the adjacent one of actuating members 14, 16. Pin 42 has an elongated undercut region 46 engaged by a pin 48 extending through a bore provided therefore in the respective actuating member and retained in place by a plate member 50. Groove pins 42 and 48 normally hold the respective die body captive on the respective actuator member while permitting relative movement therebetween. Removal of plate 50 and withdrawing of pin 48 will permit the die body and the crimping fingers therein to be separated from the actuating member.

The crimping fingers 26 at their radially outer ends engage the surface of the recess 18 formed in the pertaining actuating member so that movement of the die bodies toward the adjacent actuator members will cause the crimping fingers to move radially inwardly toward a fitting resting on the radially inner ends of the crimping fingers.

The die bodies 20, 22 have plungers 52 thereon extending from one side thereof and having inclined ends 54 engaging inclined surfaces 56 on bar-like cam members 58 slidable in the actuator members. Cam members 58 are normally biased by spring 60 in a direction to support the die bodies in spaced relation to the actuator members and forms a lost motion connection between the die body 22 and actuator member 16. However, movement of cam members 58 in a direction to release the die bodies for movement toward the actuator members is accomplished by plungers 62 which have inclined ends 64 engaging inclined end regions 66 on the cam members 58. Plungers 62 are slidably mounted in bores 68 provided in the actuators members and are retained slidably in the bores by the screws 70 which have end parts loosely fitting in slots 72 provided in plungers 62.

In the position of the parts of the die assembly in FIG. 1, the upper ends of plungers 62 are at about the same level as the upper faces of the adjacent die bodies. As will be seen in FIG. 2, each die body has associated therewith two of the plungers 52 and two of the cam members 58 so that for each die body two of the plungers 62 are provided. Both of these plungers are advantageously located at one end of the actuator member and are axially opposed to actuating plungers 74 fixedly, but adjustably, mounted in the other of the actuator members. At the left side of the lower portion of FIG. 1, a plunger 74 will be seen and it will be perceived that the plunger normally bottoms in the bore 76 provided therefor in the actuator member but can be adjusted in the axial direction and locked in adjusted positions by a clamp screw 78 which intersects bore 76.

The ends of plungers 74 are about at the level of the plane of the pertaining die body. The arrangement is such that when a fitting is placed in the lower die body and the upper die body is closed thereon, at about the moment the die bodies close on each other so as to confine the fitting, the cam members 58 commence to move in a direction to release the die bodies for movement toward the respective actuator blocks. Thus, after the die bodies 20, 22 close on each other, continued movement of members 10 and 12 and the actuator members 14 and 16 mounted thereon will take place, while the now interengaged die bodies 20, 22 remain stationary, and all of the crimping fingers will be actu-

ated inwardly toward the central axis of the fitting to be crimped simultaneously and positively. The crimped fitting is, thus, uniformly crimped about the hose and the like to which it is to be attached and is round and the combination of the hose and fitting is capable of withstanding high pressures.

Following the crimping operation, separation of the parts of the crimping die assembly will permit the die bodies and their cam members to the FIG. 1 position thereof in which they will remain until a new crimping operation is to be carried out.

As will be seen in FIG. 2, each die body can carry two sets of crimping fingers, one at each end, and be operable for crimping two fittings at one time.

The fittings receivable in the opposite ends of the die bodies and cover plates can be the same or they can be different in size, depending upon the particular work operation to be performed.

While the die set consisting of members 10 and 12 may be provided with guide rods and bushings, it is also advisable to provide the die bodies, or the end caps thereof, with guide pins 80 engageable in correspondingly shaped holes in the opposed die body or end cap so that the portions of the die body are guided quite accurately together and are held in position during a crimping operation.

It will be appreciated that the configuration of the recess 18 in each of the actuator members and the configuration of the radially outer ends of the crimping fingers is so selected that the above described relative movement between the die bodies and actuator members during the crimping operation causes equal radial movement of all of the crimping fingers so that the crimped fitting is substantially perfectly round and thus establishes uniform sealing conditions about the entire periphery thereof, thereby eliminating any regions of weakness through which leakage of fluid could be initiated when the fitting is put in service as in a hydraulic system or the like.

It will be appreciated that the crimping die assembly of this invention is quite simple to manufacture and to service and that all parts thereof are readily accessible for replacement or repair, if necessary.

Modifications may be made within the scope of the appended claims.

What is claimed is:

1. In a die for crimping fittings on tubular members such as hoses and the like: first and second separable die bodies having registering cavity means adapted to confine a fitting when the die bodies close on each other, sets of crimping fingers in said die bodies extending radially from said cavity means and reciprocal in the respective die bodies radially of the respective cavity means, an actuator member pertaining to each die body and disposed on the side thereof opposite the other die body and engaging the radially outer ends of all of the respective crimping fingers, and means for moving said actuator members toward said die bodies when the die bodies close on each other to move equally all of said crimping fingers radially inwardly toward the center of a fitting in said cavity means.

2. A crimping die according to claim 1 which includes a lost motion connection between each die body and the respective actuating member, each said set of crimping fingers being retracted from said cavity means

when the respective die body is at one limit of the lost motion connection thereof with the pertaining actuator member and moving toward said cavity means when said die body moves toward the other limit of said connection.

3. A crimping die according to claim 1 which includes means supporting each die body on the pertaining actuator member when said die bodies are separated and releasing each die body for movement toward the pertaining actuator member when said die bodies closed on each other in fitting confining relation.

4. A crimping die according to claim 1 which includes cam means interposed between each die body and the pertaining actuator member and normally supporting the die body in spaced relation to the actuator member, and means operable in response to movement of said actuator members to close said die bodies on each other in fitting confining relation to actuate said cam means into position to permit said actuator members to move toward said die bodies and thereby actuate said crimping fingers in a crimping operation.

5. A crimping die according to claim 4 which includes means for releasing said cam means simultaneously and gradually to provide for positive actuation of all of said crimping fingers simultaneously.

6. A crimping die according to claim 5 in which each cam means is in the form of a cam member slidable in the respective actuator member and spring urged toward die body supporting position, a first plunger also slidable in the respective actuator member and operatively engaging said cam member, a second plunger fixed to the other actuator member and adapted to engage said first plunger at about the time said die bodies close on each other, said second plunger moving said first plunger to actuate said cam member in die body releasing direction in response to move-

ment of said actuator members toward each other after said die bodies close on each other.

7. A crimping die according to claim 6 in which each cam member is bar-like and has a cam surface between the ends thereof, a cam follower on the pertaining die body engaging said cam surface, a spring urging said cam member toward die body supporting position, an inclined end on said cam member, and an inclined end on said first plunger engaging the inclined end on said cam member.

8. A crimping die according to claim 1 which includes means supporting said actuator members for movement toward each other to close said die bodies on each other and away from each other to separate said die bodies, and means operable during continued movement of said actuator members toward each other after said die bodies close on each other for positively actuating said crimping fingers in the radially inward direction thereof simultaneously.

9. A crimping die according to claim 8 in which each actuator member has a recess therein facing the other actuator member, each die body being mounted in a respective said recess, said crimping fingers having the radially outer ends engaging the surface of the respective recess and being spring biased radially outwardly in the respective die body, the radially inner ends of said crimping fingers being formed to crimp a fitting and being disposed radially outwardly from the limits of a said fitting in the die prior to movement of the pertaining actuating member toward the respective die body.

10. A crimping die according to claim 1 in which said cavity means comprises a pair of cavities in each die body, the cavities in each die body registering with those in the other die body when the die bodies are closed on each other whereby two fittings can be confined by the die bodies, and a set of crimping fingers in each die body for each cavity therein.

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