Feb. 27, 1968 J. W. SCHUETZ 3,370,451

APPARATUS AND METHOD FOR POINTING TUBES

Filed June 28, 1965 4 Sheets-Sheet 1

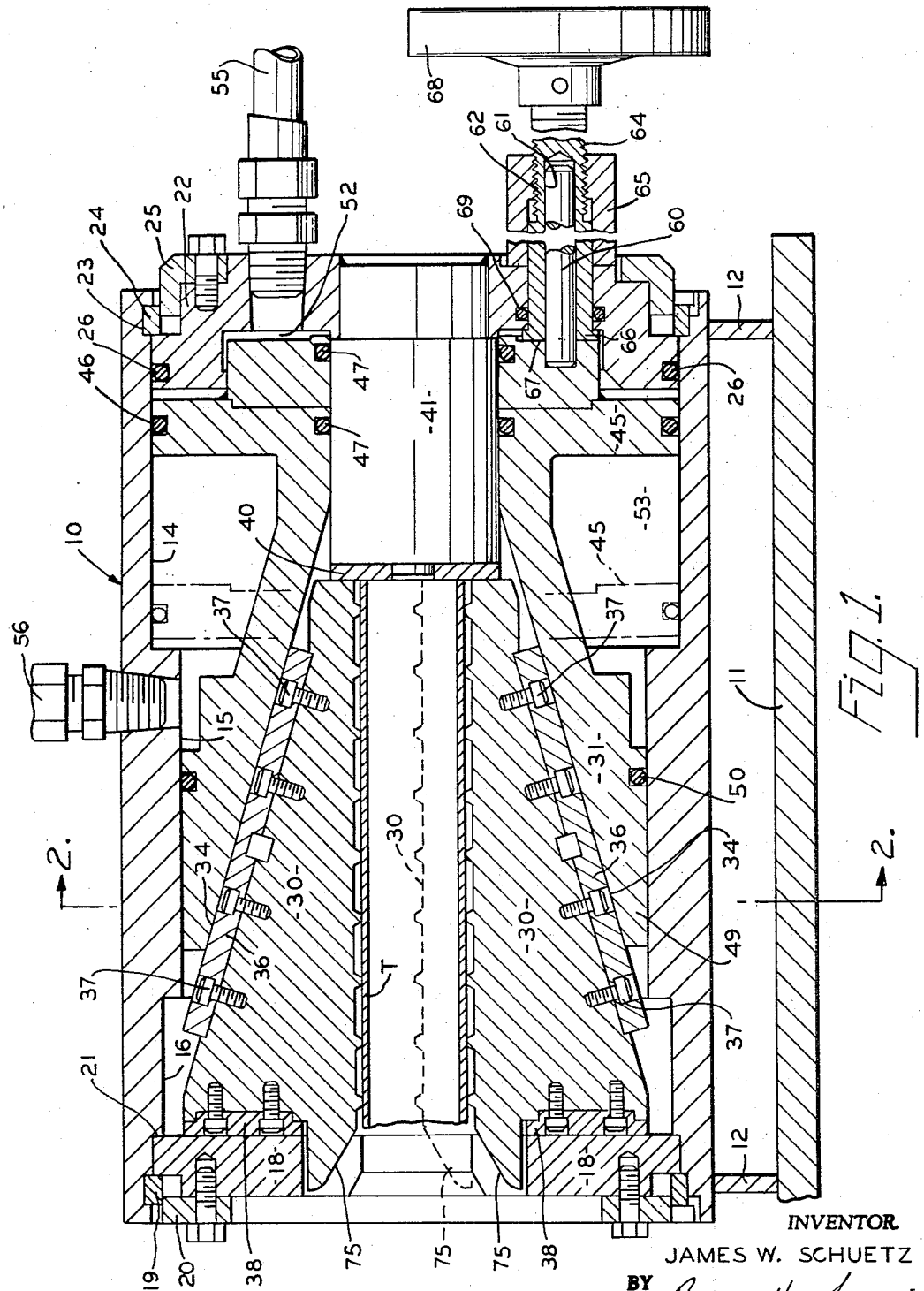

FIG. 1.

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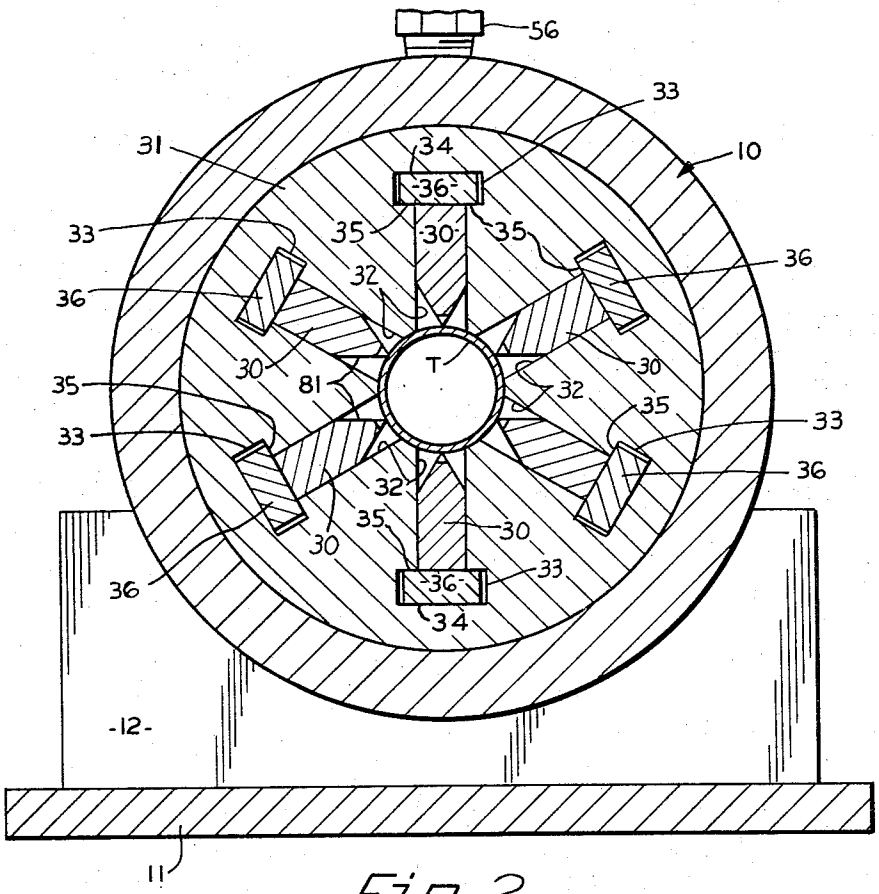

Fig. 2.

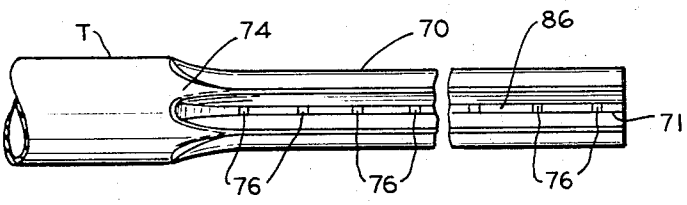

Fig. 3.

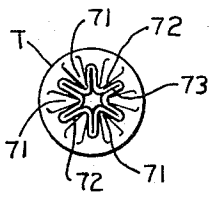

Fig. 4.

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APPARATUS AND METHOD FOR POINTING TUBES

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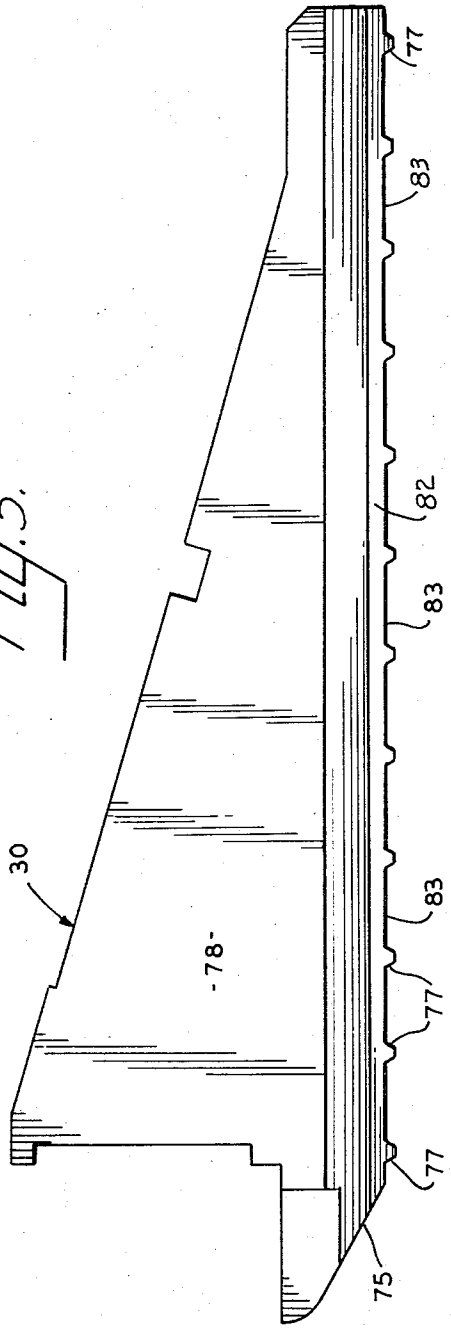

Fig. 5.

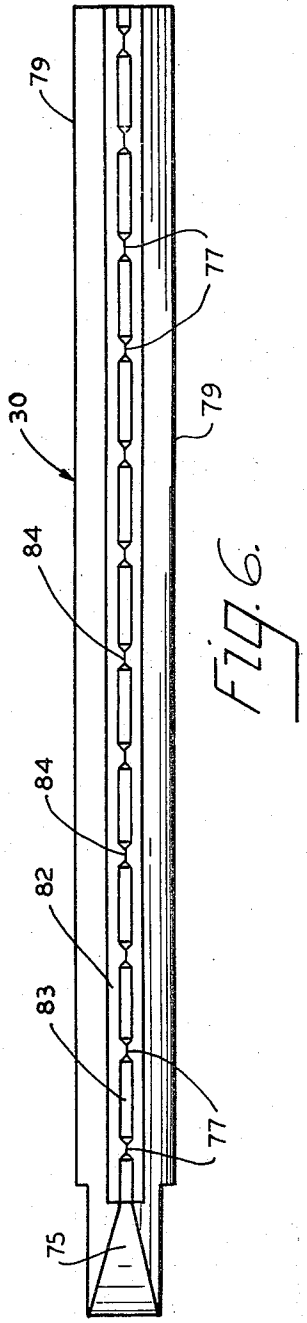

Fig. 6.

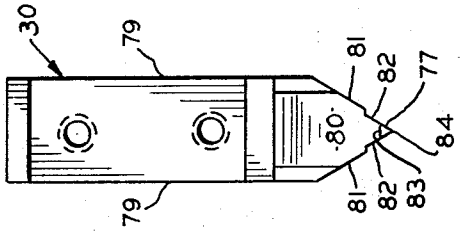

Fig. 7.

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APPARATUS AND METHOD FOR POINTING TUBES

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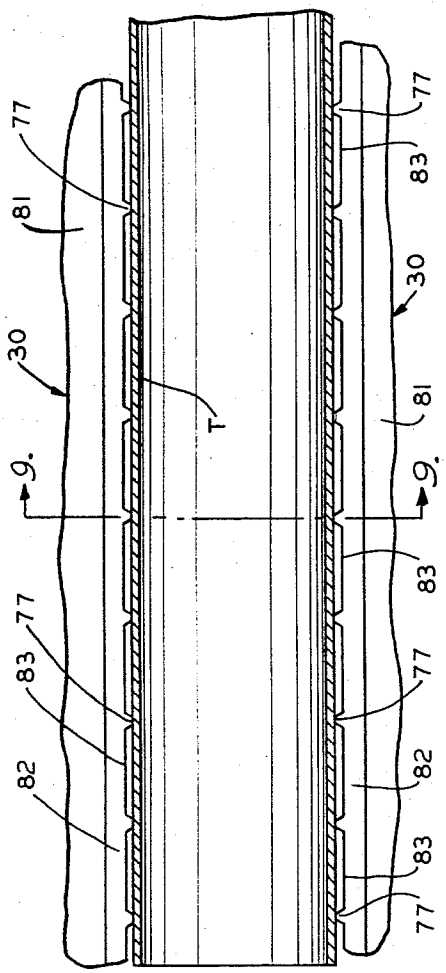

Fig. 8.

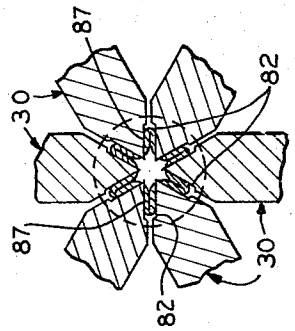

Fig. 11.

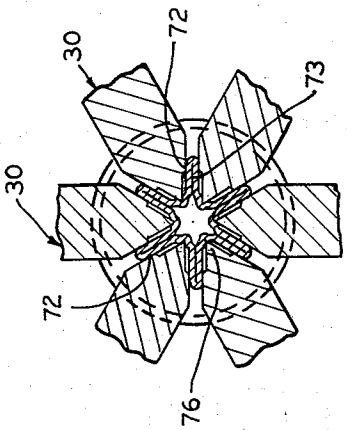

Fig. 10.

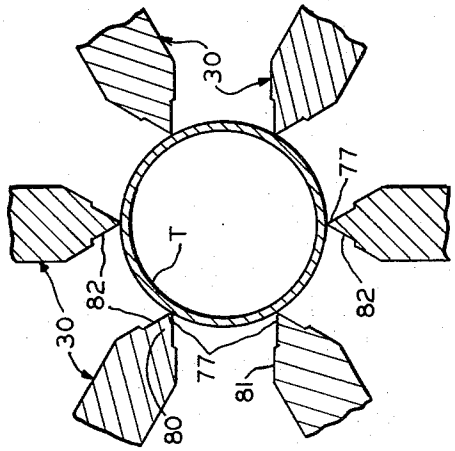

Fig. 9.

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United States Patent Office 3,370,451 Patented Feb. 27, 1968

3,370,451

APPARATUS AND METHOD FOR POINTING TUBES

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Filed June 28, 1965, Ser. No. 467,235
8 Claims. (Cl. 72—402)

ABSTRACT OF THE DISCLOSURE

Apparatus for pointing metal tubes preparatory to drawing them through a die embodying jaw members angularly spaced apart about a central axis and adapted to fold the walls of a tube inwardly to produce a tube having an end of reduced diameter made up of longitudinally extending ribs separated by intervening flutes. The jaws are V-shaped and have sharp, longitudinally spaced projections that first come into engagement with the wall of the tube and hold the tube properly centered during the pointing operation which takes place in one continuous inward stroke of the jaws.

This invention relates to an apparatus and method for pointing tubes so that they may be inserted into dies for drawing the tubes to reduce their diameter.

It is necessary to provide what is known as a point on the end of a tube before it can be drawn through a die to reduce its diameter; the point must have an overall transverse dimension such that it readily can be inserted through the die and must be long enough so that the projecting end of the point can be grasped by gripper tongs or jaws or the like on the other side of the die. If the drawing operation is to be carried out satisfactorily, the point and the juncture between the point and the remainder of the tube must be nearly as strong as the tube itself so that the metal will not be pulled apart during the drawing operation, and the point should be accurately centered with respect to the tube to prevent distortion of the tube during drawing. Also, the pointing operation should be accomplished quickly and without requiring skill on the part of the operator and the apparatus for carrying out the pointing operation should be sturdy, simple and capable of being manufactured at reasonable cost.

A general object of the present invention is to provide a machine and method for pointing tubes that meets the foregoing requirements. Other objects and advantages of the invention will become apparent from the following description of a preferred form thereof, reference being made to the accompanying drawings in which:

FIGURE 1 is a vertical axial section illustrating a preferred form of apparatus embodying the present invention.

FIGURE 2 is a transverse section taken along line 2—2 of FIGURE 1.

FIGURES 3 and 4 are side elevation and end views, respectively, of a typical tube that has been pointed in the illustrated apparatus.

FIGURES 5 and 6 are side and end elevations, respectively, of one of the gripper jaws used to deform the tube.

FIGURE 7 illustrates the inner or working face of the gripper jaw illustrated in FIGURES 5 and 6.

FIGURE 8 is a fragmentary elevation showing the initial engagement between the gripper jaws and a tube to be pointed.

FIGURE 9 is a section taken as indicated by line 9—9 of FIGURE 8.

FIGURE 10 is a similar section, but showing the jaws in their innermost position.

FIGURE 11 is similar to FIGURE 10, but shows a

Briefly, a preferred form of apparatus comprises a fluid operated chuck or similar mechanism that is adapted to urge a series of V-shaped gripper jaws or dies radially inwardly into engagement with the length of tube to be pointed. The jaws each have a series of longitudinally spaced points that first engage the tube and thus hold the tube against slippage with respect to the dies. As the jaws move inwardly, they fold the tube into a fluted form having a maximum dimension sufficiently smaller than the original outer diameter of the tube to permit the end of the tube readily to be inserted into the drawing die. The folding operation is completed in one continuous movement of the jaws and as soon as the inward movement of the jaws is completed, they are automatically retracted so that the tube can be removed from the apparatus ready for drawing through a die.

As shown in FIGURES 1 and 2 of the drawings, a preferred form of apparatus comprises a cylinder **10** supported on an appropriate base made up of a horizontal plate **11** and vertical plates **12** disposed at either end of the cylinder **10** and having arcuate saddle portions to receive the cylinder. The vertical members **12** preferably are welded to the base member **11** and the cylinder **10** may be welded to the vertical members **12**. The internal bore of the cylinder **10** has a rear portion **14** of greatest diameter, an intermediate portion **15** of reduced diameter and a forward end portion **16** of enlarged diameter as compared to the intermediate portion **15**. At the front end of the cylinder there is a front cylinder head **18** that is held in place by a key **19** and an annular ring **20** and is prevented from inward movement by a shoulder **21** in the cylinder bore. There is also a rear cylinder head **22** that is held in place against a shoulder **23** in the cylinder bore by a key **24** and a ring **25**. The rear cylinder head is sealed to the cylinder as by a conventional O-ring **26**.

In order to form the required points on tubes, a plurality of angularly spaced gripper jaws **30** are disposed within the cylinder. Six jaws are shown in the drawings, but fewer or more jaws can be employed if desired. A tube T is shown in FIGURES 1 and 2 to illustrate the initial engagement between the jaws and the tubes. In order to move the jaws **30** inwardly to deform the tube to provide the desired flutes and reduce the diameter thereof, a hydraulically operated chuck **31** is disposed within the cylinder **10**. Chuck **31** is provided with radial slots **32** in which the jaws **30** are slidably mounted and in order to move the jaws inwardly and outwardly upon axial movement of the chuck, the slots **32** are T-shaped as shown, with enlarged head openings **33** that are defined by sloping outer camming surfaces **34** and inner camming surfaces **35** that are parallel to the surfaces **34**. The jaws **30** are provided with T heads **36**, preferably composed of a material such as bronze in order to reduce friction the strips being secured to the jaws by cap screws **37**. The forward ends of the jaws are provided with wear plate **38** that bear against the inner surface of the forward cylinder head **18** while the rear ends of the jaws bea against a washer **40** that is supported by a plug **41** tha projects inwardly from the rear cylinder head **22**. Th jaws are prevented from longitudinal movement by th front cylinder head **18** and the washer **40** and thus recip rocating movement of the chuck **31** within the cylinde **10** will cause the dies to move radially inwardly and ou wardly. The jaws and the chuck are shown in full lin in FIGURE 1 in their fully retracted position; the broke lines in the lower part of FIGURE 1 indicate the inne most position of the jaws and the corresponding forwa position of the chuck.

In order to reciprocate the chuck **31** within the cylind **10**, the chuck is provided with a rear piston portion that operates within the bore **14** and also slides alo

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