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CHUCK FIXTURE FOR TUBE BENDING APPARATUS

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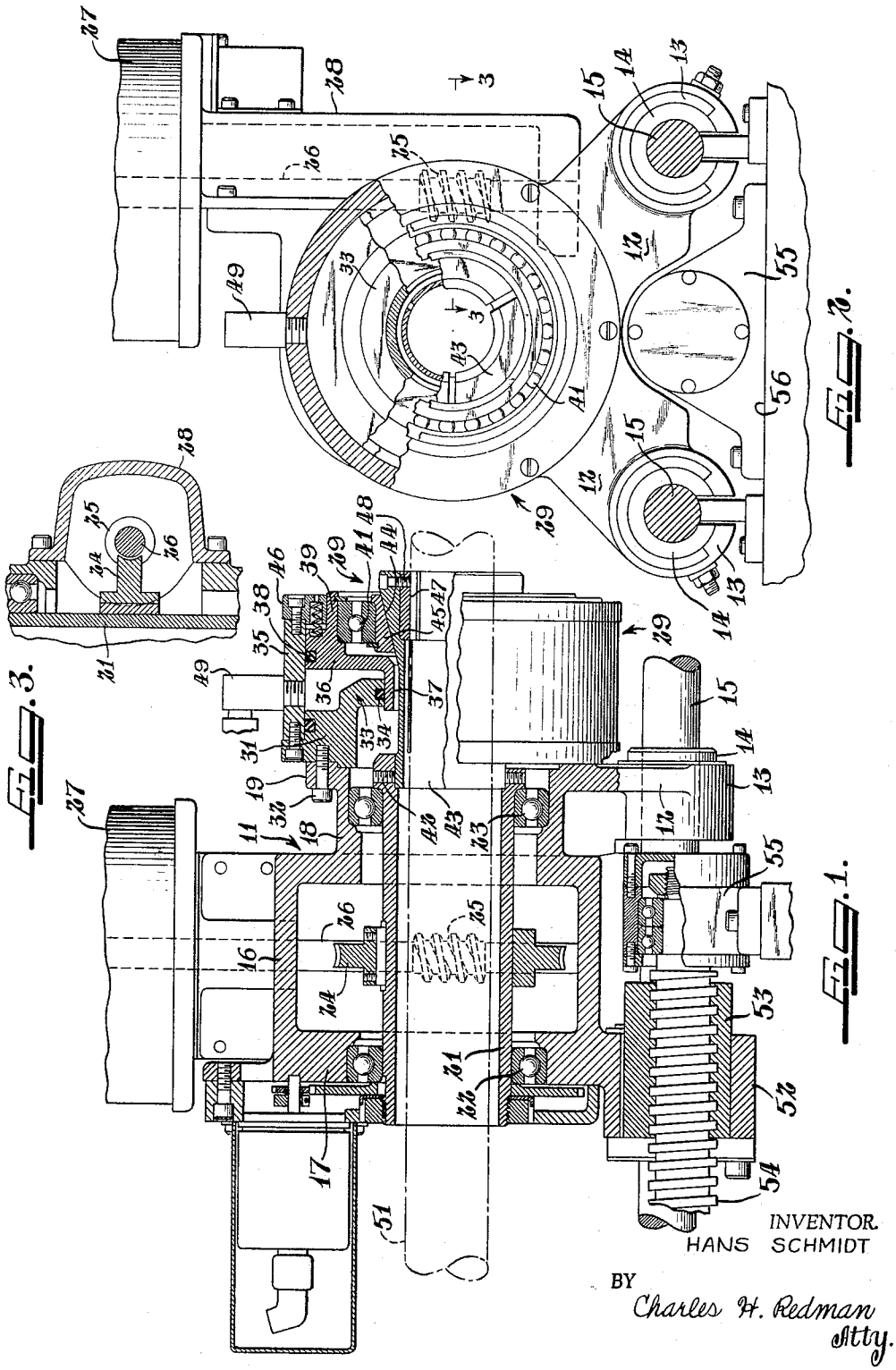

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CHUCK FIXTURE FOR TUBE BENDING APPARATUS

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This invention relates to improvements in tube bending aparatus and is particularly concerned with the novel construction of a chuck-fixture assembly designed to selectively clamp, rotate and advance a length of tubular stock or like article to the bending dies.

More particularly, the chuck is carried on a fixture that is slidable toward and away from the apparatus bending dies so as to permit progressive advance of the tubular stock through said dies for performing successive bends therein at the same or different radial angles. This is accomplished by mounting the chuck-fixture assembly on longitudinal guides and associating with it a screw that operates to advance and withdraw the assembly. The chuck is controlled by air pressure so as to automatically engaged with tubular stock of various diameters and is associated with drive means operable at selective intervals to rotate the tubular stock about its axis.

It is, therefore, an object of the invention to provide a chuck assembly of the character referred to.

Another object is to provide a novel structure and means for actuating a chuck.

Another object of the invention is to provide a chuck assembly of the character referred to which is not expensive to manufacture and is positive and efficient in its operation.

The structure by means of which the above noted and other objects and advantages of the invention are attained will be described in the following specification, taken in conjunction with the accompanying drawings, showing a preferred illustrative embodiment of the invention, in which:

FIG. 1 is a diametrical sectional view of the chuck-fixture assembly, showing parts in elevation;

FIG. 2 is a view looking at the chuck end of the assembly, showing parts broken away; and,

FIG. 3 is a detail sectional view taken on line 3—3 of FIG. 2.

Referring to the accompanying drawings, the chuck-fixture assembly comprises a substantially cylindrical housing **11** having at least one pair of downwardly extending outwardly diverging legs **12** each terminating in a cylindrical mounting boss **13**, including bearing bushings **14**. These mounting bosses are fitted over and are guided along a pair of rigid guides, such as rods **15**, so that the assembly can be shifted longitudinally along said guides in either direction.

The housing **11** includes a cylindrical body portion **16** having an axially apertured wall **17** at one end and an axial neck **18** of reduced diameter extending outwardly from its other end, said neck terminating in an external flange **19** with which the legs **12** merge.

An axial sleeve **21** is mounted in the housing, suitable anti-friction bearings **22–23** being provided therefor in the end wall **17** and neck **18**, respectively. The sleeve mounts firmly, intermediate its ends and within cylindrical body **16**, a ring gear **24** with which is meshed at all times a worm gear **25** mounted on a vertical shaft **26** depending from a motor **27**. This gear-shaft assembly is enclosed in a casing **28** secured to one side of housing **11**, as best shown in FIG. 3, and the motor **27** is secured firmly on the upper end of said casing. It should be evident that during operation of motor **27**, which is a reversible type, the sleeve **21** may be rotated in either direction.

A chuck assembly, generally indicated at **29** is mounted firmly on the external neck flange **19**. As best shown in FIG. 1, this assembly includes a back wall **31** that is secured to flange **19**, as by bolts **32**, and which has an internal annular flange **33** mounting a sealing ring **34**. A cylindrical wall **35** is secured to the outside margin of said back wall **31** to define a cylinder within which a ring type piston **36** may operate. This piston includes an inner flange **37**, on which the sealing ring **34** seats, and its outer perimeter carries a sealing ring **38** that has a sliding fit within cylindrical wall **35**. The piston includes an external neck **39** in which is seated the outer raceway of an antifriction bearing **41**.

The forward end of axial sleeve **21** mounts firmly, as by set screws **42**, a collet **43** having an outwardly flared external surface **44** over which is slidable a ring **45** upon which the inner raceway of bearing **41** is secured. A cap ring **46** closes the front end of the piston cylinder wall **35**. The free end of the collet **43** mounts sizing segments **47** secured, as by screws **48**, which are changeable for segments of different thicknesses to adapt the collet for holding tabular stock of different diameters. It should be obvious that when air is admitted under pressure into the interior of cylinder wall **35**, as through a conduit **49**, the piston **36** moves forward (to the right in FIG. 1) so as to contract the chuck firmly about a length of tubular stock **51**. When pressure is relieved, the collet expands to release the tubular stock.

In order to advance the tubular stock towards and away from the bending dies, the housing **11** has a depending centrally located boss **52** carrying firmly an internally threaded body **53** through which a threaded rod **54** extends. This rod may have its forward end journalled for free rotation in a bearing block **55** mounted on a suitable support surface **56** and its other end is operably connected to a motor (not shown) for selectively rotating said rod.

In operation, the assembly functions to grasp a length of tubular stock and feed it in successive stages to the bending dies. At predetermined times, determined by the setting of the controls for motor **27**, the stock is rotated about its axis so as to position it in the dies for performance of a bending operation in a predetermined direction. In actual use, the operation of the chuck, drive motor for the threaded rod, and motor **27** are all controlled automatically so as to provide for a continous sequence of tubular stock feeding, rotating when required, and engagement and disengagement of the chuck with the stock at the start and finish of the bending operations.

Although I have described a preferred embodiment of my invention, in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of the structure disclosed may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

What I claim and desire to secure by Letters Patent of the United States is:

1. In apparatus for performing work on a length of tubular stock, a non-rotatable housing, a sleeve extending through said housing and through which the stock extends, chuck jaws extending from one end of said sleeve and between which the stock extends, a collar surrounding said chuck jaws and movable axially thereover for contracting said jaws about the stock, a piston-cylinder assembly carried by said housing and having its piston operably associated with the collar for moving said collar in a direction to close the jaws, means operable to permit said jaws to open when the piston is ineffective,

and means in said housing to rotate the sleeve and chuck jaws.

2. In apparatus for performing work on a length of tubular stock, elongated guide rails, a non-rotatable housing slidable along said guide rails, screw means operable to advance and retract the housing along said giude rails, a sleeve extending through said housing and through which the stock extends, chuck jaws extending from one end of said sleeve and between which the stock extends, a collar surrounding said chuck jaws and movable axially thereover for contracting said jaws about the stock, a piston-cylinder assembly carried by said housing and having its piston operably associated with the collar for moving said collar in a direction to close the jaws, means operable to permit said jaws to open when the piston is ineffective, and means in said housing to rotate the sleeve and chuck jaws.

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