June 25, 1957 A. DIAS 2,796,792

MACHINE FOR AND METHOD OF CUTTING GROOVES IN PIPES

Filed July 16, 1954 3 Sheets-Sheet 1

Fig. 1.

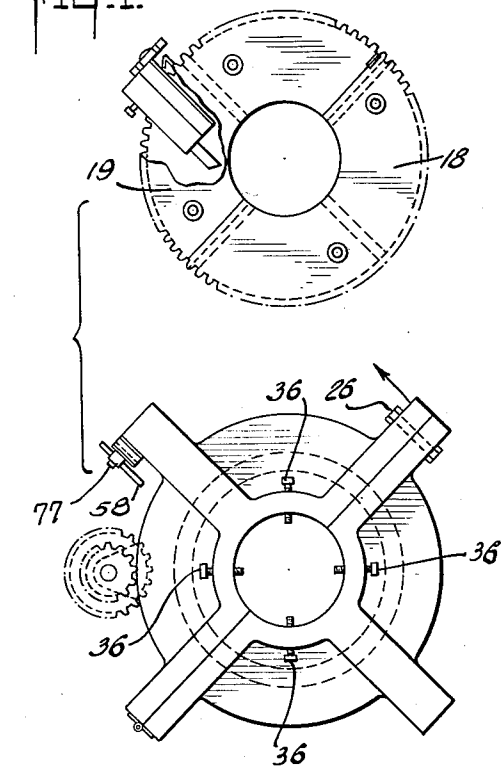
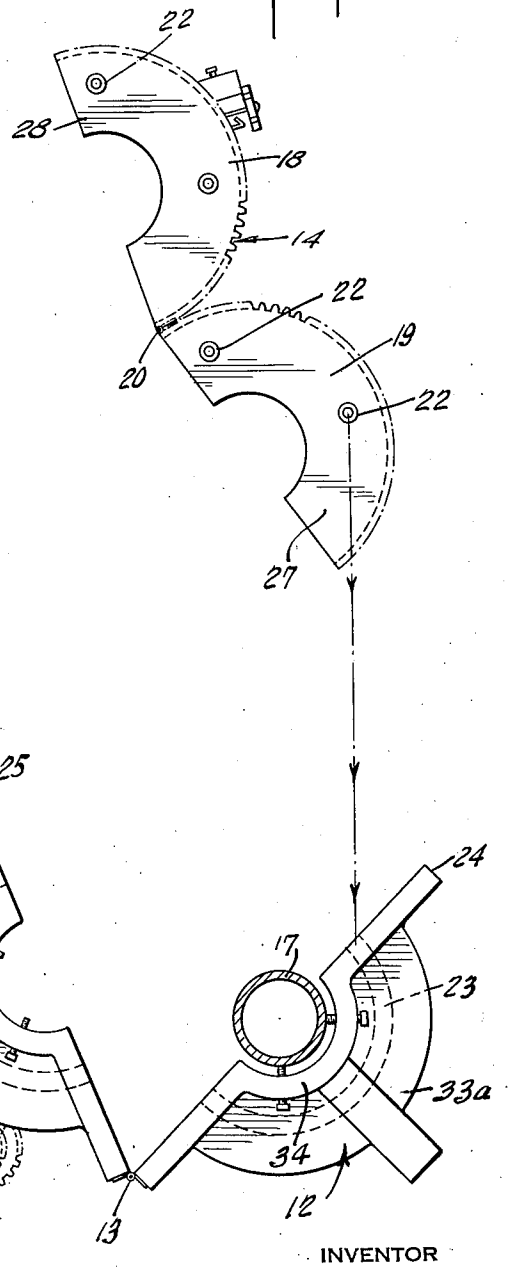


Fig. 2.



INVENTOR
AVELINO DIAS
BY
Harry Sommers
ATTORNEY

June 25, 1957 A. DIAS 2,796,792

MACHINE FOR AND METHOD OF CUTTING GROOVES IN PIPES

Filed July 16, 1954 3 Sheets-Sheet 2

FIG. 4.

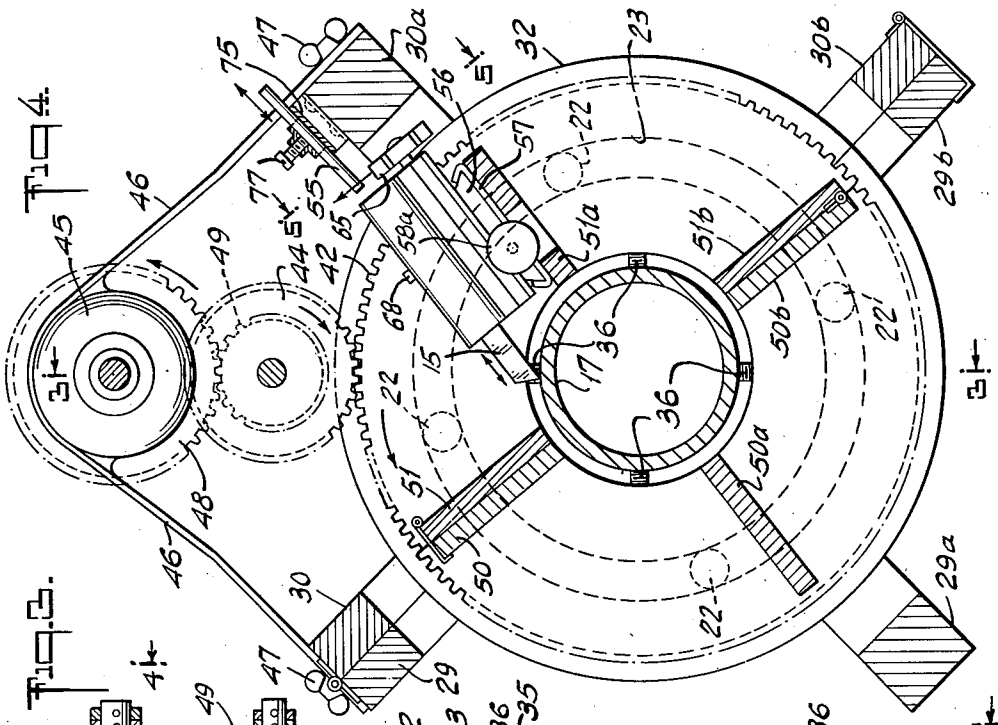
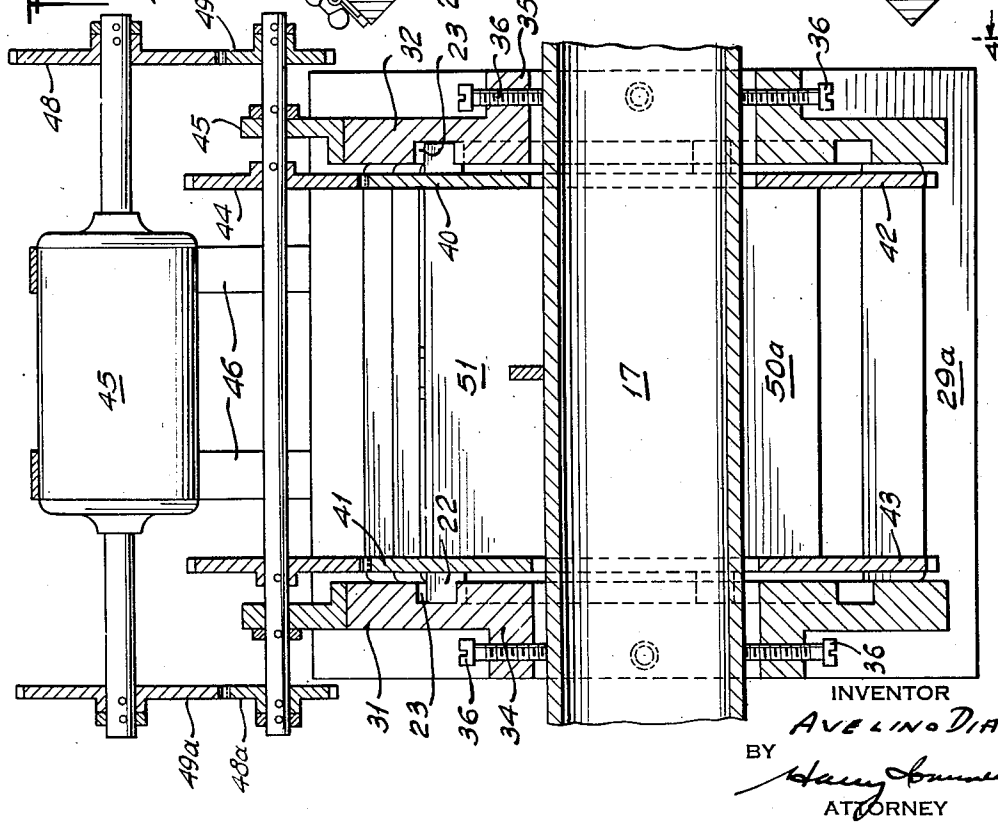


FIG. 5.



INVENTOR
AVELINO DIAS
BY
ATTORNEY

June 25, 1957 A. DIAS 2,796,792

MACHINE FOR AND METHOD OF CUTTING GROOVES IN PIPES

Filed July 16, 1954 3 Sheets-Sheet 3

Fig. 5.

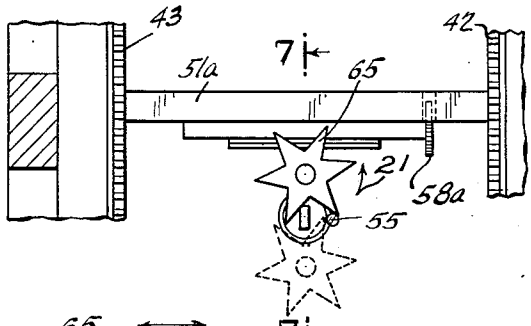


Fig. 6.

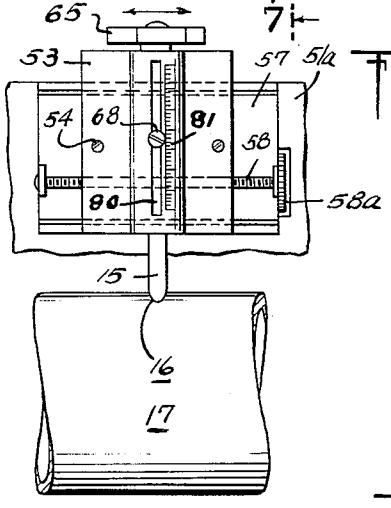


Fig. 7.

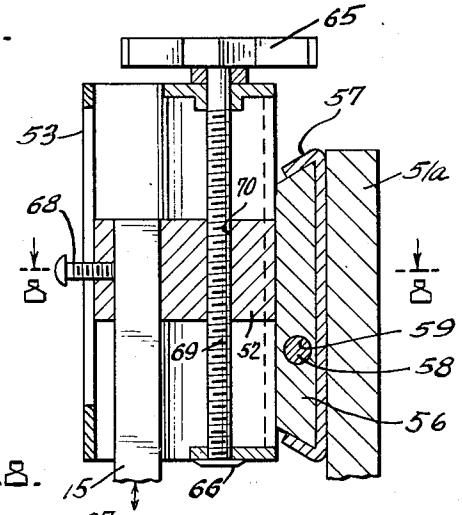


Fig. 8.

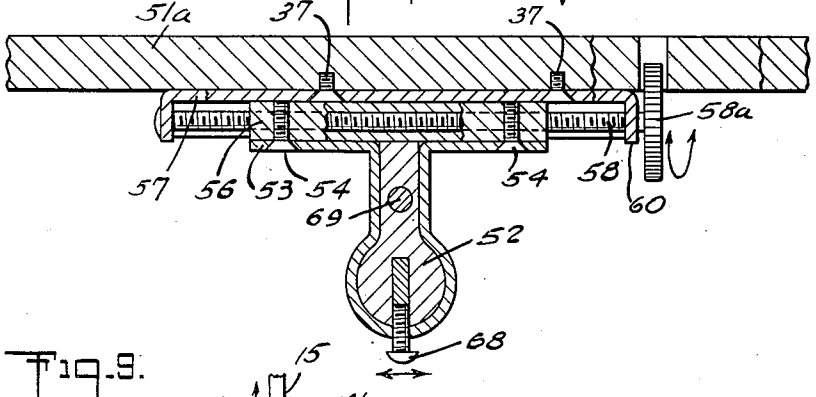
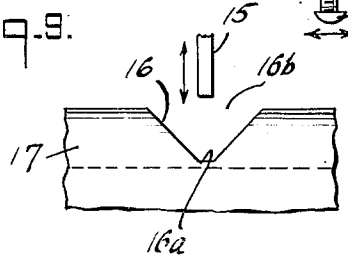


Fig. 9.



INVENTOR
AVELINO DIAS
BY
ATTORNEY

United States Patent Office 2,796,792 Patented June 25, 1957

2,796,792

MACHINE FOR AND METHOD OF CUTTING GROOVES IN PIPES

Avelino Dias, Lodi, N. J.

Application July 16, 1954, Serial No. 443,809

1 Claim. (Cl. 82—4)

The device and method of present invention are intended primarily for cutting grooves in pipes. One of the uses of which the invention is especially adapted is for the cutting of welded sections out of pipe sections which are already installed for example, in installations in industrial plants, where it is necessary to remove the welds of welded pipes periodically in accordance with insurance regulations, and to reweld the pipe sections. In such installations the invention is adapted to be conveniently secured to the pipe section and the weld readily cut therefrom in a practically automatic fashion requiring a minimum of attention, with other advantages noted below. Device of the invention is adapted to be readily secured directly to the pipe section as described below and to be readily removed therefrom upon completion of the operation.

These and other advantageous objects, which will appear from the drawings and from the description hereinafter, are accomplished by the structure of my invention, of which an embodiment is illustrated in the drawings. It will be apparent, from a consideration of said drawings and the following description, that the invention may be embodied in other forms suggested thereby, and such other forms as come within the scope of the appended claim are to be considered within the scope and purview of the instant invention.

In the drawings:

Fig. 1 is a side elevational view of a ring member and an outer casing member embodying the invention,

Fig. 2 is a schematic view showing (by arrows) the manner in which the ring member may be inserted into the casing member and over the pipe section to be operated on pursuant to the invention,

Fig. 3 is a transverse sectional view taken on line 3—3 of Fig. 4,

Fig. 4 is a vertical elevational sectional view taken on line 4—4 of Fig. 3,

Fig. 5 is a fragmentary plan view of the ring member and (attached thereto) the tool unit of the device, movable in the direction indicated by the arrow 20 to the position indicated by the dotted lines in Fig. 5,

Fig. 6 is a fragmentary elevational view taken on line 6—6 of Fig. 5,

Fig. 7 is a fragmentary vertical sectional view taken on line 7—7 of Fig. 5,

Fig. 8 is a fragmentary horizontal sectional view taken on line 8—8 of Fig. 7, and

Fig. 9 is a fragmentary elevational view of a pipe wherein a groove has been formed pursuant to the invention, by the tool shown fragmentarily.

As shown in the drawings, the device of this invention comprises an outer casing 10 which may be of any desired or convenient form, consisting preferably of two sections 11 and 12 pivotally connected at one end 13 so that the said sections may open for reception of the ring 14 to be rotatably positioned therein as presently described. Said ring 14, which carries the tool 15 for cutting the groove 16 in the pipe 17, is in turn preferably formed of a plurality of sections as, for example, the sections 18, 19 (Fig. 2), which are pivotally connected as at 20. In assembling the device on the pipe 17 wherein the groove is to be cut, a section of outer casing 10 is first held in position against the pipe (as in Fig. 2) with the other section of the outer casing open; then a section of the ring 14 is inserted by positioning the rollers 22 of said ring within the recess or track 23 formed in the outer casing. Then the second section of the ring is brought down to close over the pipe and against the first section (see Fig. 1), while the rollers 22 of the second section of the inner ring are entered in the recess of the second section of the outer casing 10, which is then closed onto the first section to the form shown in Figs. 1 and 4. The free ends 24, 25 of the sections 12, 11 of the outer casing may be secured together by bolt or other means 26, Fig. 1, and similarly, the free ends 27, 28 of the ring may be secured together by any suitable bolt or other means (not shown). In the form of invention specifically illustrated in the drawings, it will be noted (Fig. 3) that each section of outer casing 10 comprises a plurality of frame-like U-shaped plates (29, 29*a* and 29*b* for one and 30, 30*a* and 30*b* for the other) section of the outer casing. The said U-shaped plates of series 29 and 30, are secured at the free ends of their leg portions to flat walls 31, 32 defining the sides of said outer casing 10. The said flat walls 31, 32 contains a circular recess 23 at each side of the casing 10 for reception of the rollers 22 of the inner ring. Each side wall of casing 10 is in turn formed of two parts which can best be seen from Fig. 2, wherein the said two parts of one of the walls of the outer casing are marked 33, 33*a*. The opposite wall (32) of the said casing is similarly formed. The flat walls 31, 32 of the outer casing are provided with hub-like medial portions 34—35 (Fig. 3) which may similarly be formed in halves for each of the sides of the outer casing, as shown in Fig. 2. Means (36, Figs. 1 and 3) may be provided to engage the pipe to rigidly secure the casing sections thereto.

Ring 14 in turn, is preferably formed of two opposite wall members 40, 41 which may be exteriorly toothed as indicated at 42, 43 in Figs. 3 and 4, for meshing engagement with a gear 44 secured to a section of casing 10 as at 45. By the arrangement above described, the outer casing may be secured to the pipe with the ring rotatably 14 disposed therein, and then it is a simple matter to secure a motor 45 to the outer casing as by means of plates 46 fixed to the motor bolts 47 or the like securing said plates to one of the casing sections as shown in Fig. 4. Thus motor 45 may be secured to casing 10 after the latter is attached to the pipe (or other drive means may be substituted) having means such as driving gear 48 for meshing with a pinion 49 on the drive member 44 which is fixed to the casing 10. In the form as shown in Fig. 3, a second pinion 49*a* is provided in mesh with a second driving gear 48*a* is shown. It will be apparent that upon securing the device to a pipe section and actuating the motor 45, the ring will be rotated internally of the casing.

A plurality of transverse plates 50, 50*a* and 50*b* connect the side wall portions 40, 41 of one half of the ring; similar plates 51 51*a* and 51*b* connect the side walls of the other half of the ring 14. One of the plates of the series 50, 51 is provided with means for holding the tool 15 movably for cutting the groove in the pipe when moved thereon, as above described. Said means preferably comprise, as shown in Figs. 6, 7 and 8, a housing 53 for the tool 15 and bearing 52 to which the tool is keyed as at 68, said bearing being movable in the housing.

Housing 53 and tool 15 are preferably provided with

complementary means for moving the tool axially in the housing on rotation of the ring **14**. Said means may, as shown in Figs. 7 and 8 of the drawings, consist of providing a pin **55** fixed to casing **10** (Figs. 4, 1 and 5) and complementary means on the bearing to be engaged by the pin for moving the tool axially in the bearing on rotation on the ring to progressively move the tool onto the pipe to cut the groove therein. This means is such that upon continued rotation of the ring within the casing, the tool will be progressively moved axially onto the pipe to progressively cut the groove therein. Means are also provided for moving the tool in a direction at right angles to its axis to cut parallel grooves in the pipe; said means may, as shown in Figs. 6 and 7, comprise mounting the housing **53** for the bearing **52** on a slide **56** (as at **54**). The slide **56** is movably disposed in a channel member **57**, with suitable means, such as a screw **58**, in mesh with a threaded aperture **59** of the slide **56**, the said screw being journaled in a bearing **60** fixed to the channel member **57**. The channel member **57** is in turn preferably rigidly secured to the plate **51***a* of the ring **14** as at **37**, Fig. 8. It will be appreciated that the pin **55**, which is fixed to the outer casing **10**, is stationary and that as ring **14** rotates, a part, such as a star wheel **65**, which (Fig. 7) may be journaled as at **66** in the housing **53**, may contact the pin and thereby be rotated one segment for each revolution of the ring within the casing. This rotation of the star wheel **65** will in turn be translated into axial movement of the tool **15** by suitable means, as for example, by providing bearing **52** to which the tool **15** is keyed as at **68** with an internally threaded portion **70** (Fig. 7) and star wheel **65** may be provided with a threaded stem **69** for engagement therewith. Since the star wheel stem **69** is journaled as at **66** in the housing **53**, the star wheel will rotate upon contact with the pin **55** of the outer casing **10** (Fig. 5). This rotation will in turn be translated into axial movement of tool **15** for the purpose above described.

In operation the tool **15** will be first adjusted so that center **16***a* of the groove to be formed, the said tool automatically moving downwardly from the top surface of the pipe (**16***b*) progressively in response to rotation of the ring. The tool may then be brought up to its original position shown in Fig. 9 by manually rotating the star wheel **65** in a reverse direction, or by any other suitable means, and then the tool may be shifted to a position at right angles to its axis in the ring by moving the housing **53** (by the rotation of the head **58***a* of the screw **58** as will become readily apparent upon examination of Fig. 8 of the drawings). The pin **55** may likewise be correspondingly moved so as to be properly positioned for contact of the star wheel **65** of the tool therewith by any suitable means, as for example, by providing a frame **75** (Fig. 4) which may be rigidly fixed to one of the plates **30***a* of the outer casing, said frame having a transverse slot therein to slidably receive the reduced portion **78** (Fig. 2) of a casing to which the pin **55** may be secured as by means of the bolt **77**. By this arrangement, not only may the position of the pin **55** in its casing **78** be adjusted by the bolt means so as to determine how far said pin will project downwardly and into the path of the star wheel **55** of the ring (see Fig. 4) but also the pin **55** may be shifted transversely in order to correspond with the similar shifting of the tool **15** by the means above described.

The position of the tool **15** in the housing **53** may likewise be initially adjusted if desired, by means such as the key **68** shown in Figs. 7 and 8. Movement of the ring **14** will carry the star wheel **65** secured thereto (Fig. 5) against the pin **55** and cause rotation of the star wheel and progressive movement of the tool **15** downwardly into the pipe as indicated by the arrow **21**, Fig. 5 indicating rotation of the star wheel on contacting the stationary pin **55** on movement of the ring in Fig. 5.

The groove **16** is formed by first cutting the center of the groove by movement of tool **15** to point **16***a*, Fig. 9, and then moving the tool and the pin **55** sideways by the means **58***a*, **78**, the tool being elevated and reset after completing each vertical cut to the complete desired depth until one-half the groove is cut; then the same operation is repeated for the other side of the groove. Member **68** moves vertically in slot **80** of housing **53** in unison with tool **15**, and suitable markings **81** may be provided on said housing to thus indicate the depth of groove **16** cut by tool **15**.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

A machine for cutting a groove in a pipe comprising a casing including a pair of semi-circular pipe encircling sections connected together for completely encircling a pipe therein, each section being provided with a pair of semi-circular spaced walls perpendicular to the axis of the pipe, whereby a pair of circular walls are provided in the closed position of the sections that completely encircle the pipe, said walls being provided on their inner opposed faces with circular bearing recesses, a pair of semi-circular tool holder members removably disposed within the casing having spaced walls adjacent the walls of the casing and rollers on the walls of said members engageable within said recesses, a tool movably disposed on the ring member for cutting the groove in the pipe, and complementary means on the casing and ring for engagement with the tool for progressively moving same onto the pipe for cutting the groove therein.

References Cited in the file of this patent

UNITED STATES PATENTS

398,481	Whitney	Feb. 26, 1889
680,228	Couston	Aug. 13, 1901
899,536	Jacobs	Sept. 29, 1908
1,030,981	Dickert	July 2, 1912
1,301,759	Stewart	Apr. 22, 1919
1,747,944	Lyne	Feb. 18, 1930
1,797,944	Dustan	Mar. 24, 1931
1,985,541	Hoefer	Dec. 25, 1934
2,519,087	Tydeman	Aug. 15, 1950

FOREIGN PATENTS

198,621	Great Britain	June 7, 1923