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2,414,731

GRINDING ATTACHMENT FOR GRINDING THE END FACE OF PIPES

Filed Oct. 30, 1944

3 Sheets-Sheet 1

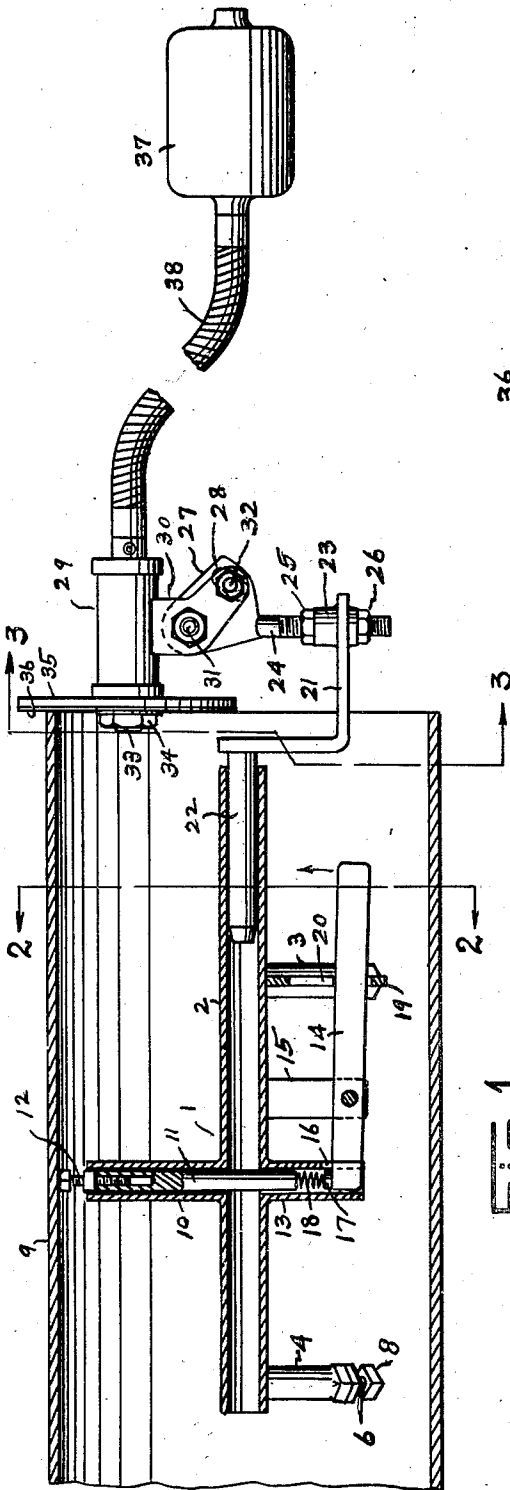


Fig. 1.

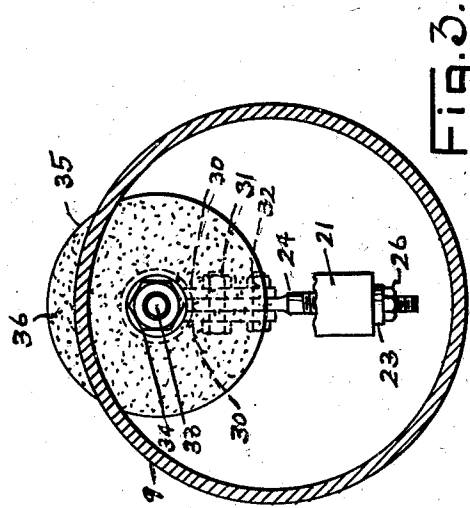


Fig. 2.

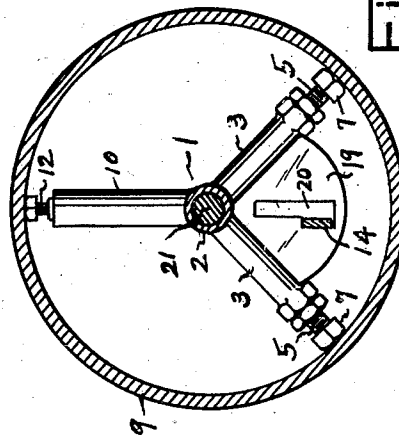


Fig. 3.

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3 Sheets-Sheet 2

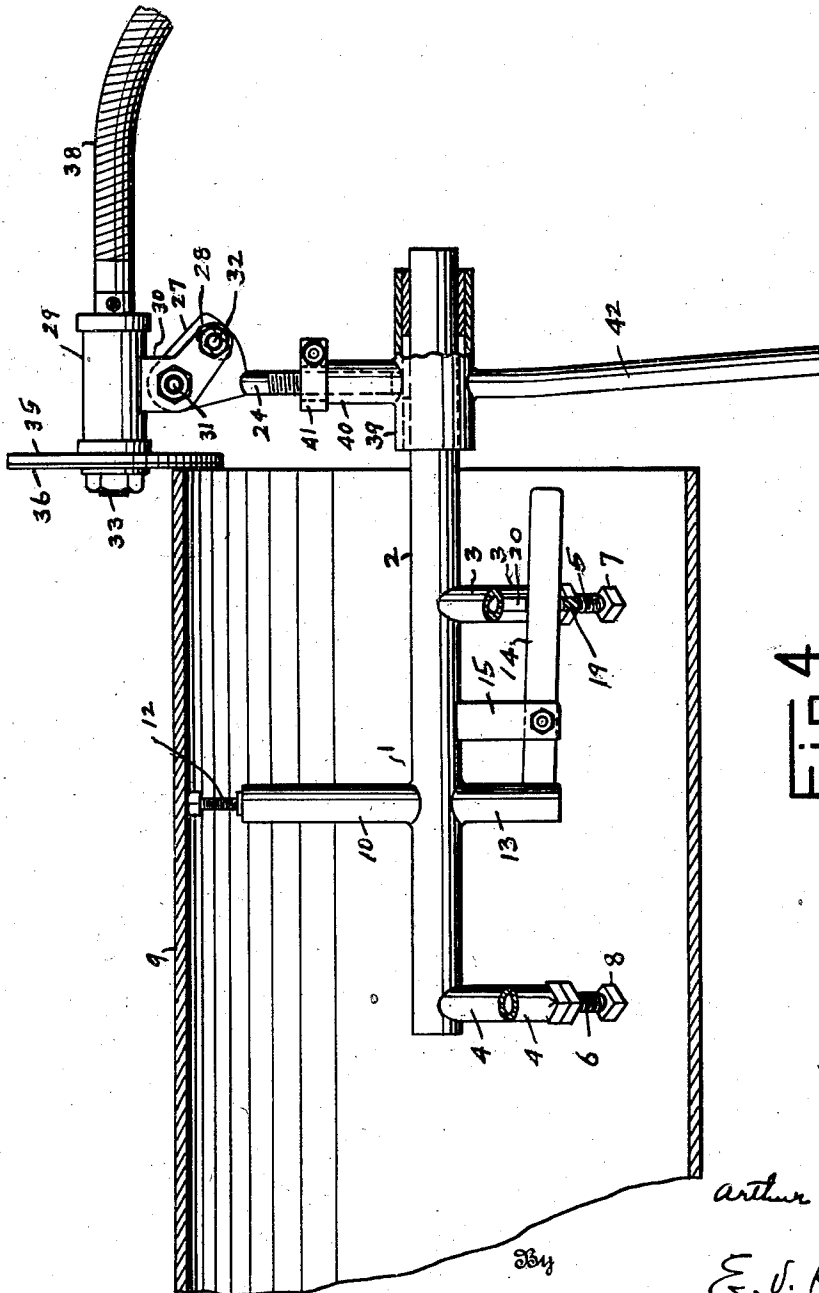


Fig. 4.

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3 Sheets-Sheet 3

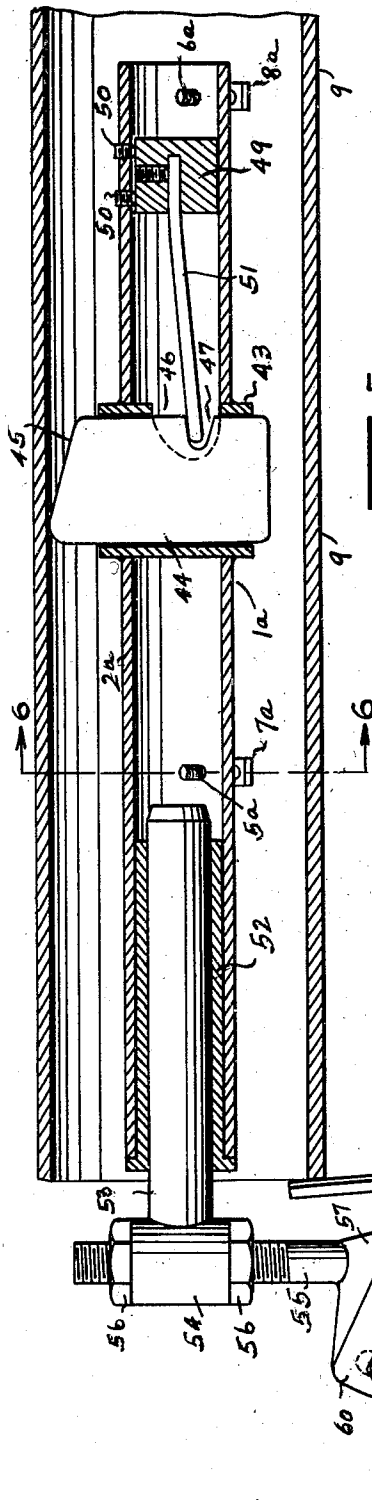


Fig. 5.

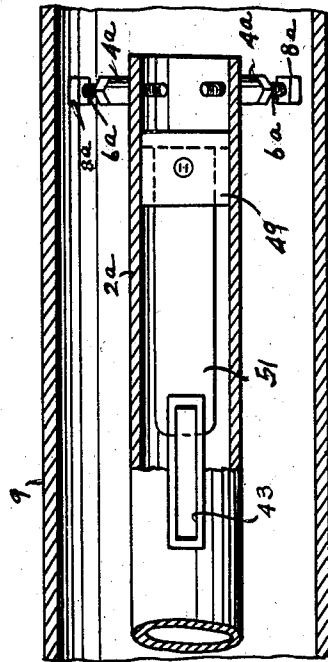


Fig. 7.

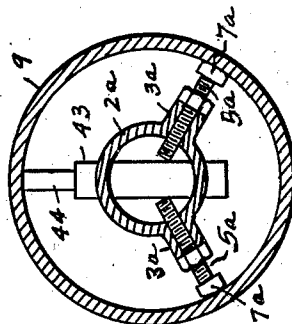


Fig. 6.

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UNITED STATES PATENT OFFICE

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GRINDING ATTACHMENT FOR GRINDING
THE END FACE OF PIPES

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Application October 30, 1944, Serial No. 561,101

2 Claims. (Cl. 51—241)

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This invention relates to a grinder and has particular relation to a grinder of the character described which has been specially designed for grinding and smoothing pipe ends.

In welding sections of pipe together it is desirable to cleanse and smooth the ends to be welded together. This is particularly true in the construction of pipe lines where the ends of the pipe must be accurately fitted together so as to form a perfect weld to prevent leakage. An object of the invention is to provide a grinding machine of the character described which may be readily applied to the pipe and supported relative thereto during the grinding operation and which may be easily and quickly removed when the grinding operation has been completed.

In preparing the ends of the pipe which are to abut for the welding operation it is sometimes desirable to grind the ends to a bevel so that when the ends are brought into abutting relation an outwardly flared V-shaped groove will be formed between them so that they may be readily welded together by any known means. The grinding machine herein described has been so constructed that the end of the pipe being ground may be ground on a bevel if that be desired.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 shows a side view of one form of the machine shown partly in section and applied to the pipe end.

Figure 2 shows a sectional view taken on the line 2—2 of Figure 1.

Figure 3 shows a sectional view taken on the line 3—3 of Figure 1.

Figure 4 shows a side elevation, partly in section, of another embodiment of the invention.

Figure 5 shows a side view, partly in section, of still another embodiment of the invention.

Figure 6 shows a cross, sectional view taken on the line 6—6 of Figure 5; and

Figure 7 shows a fragmentary, sectional view thereof.

Referring to the embodiment illustrated in Figure 1, the numeral 1 designates the supporting frame as a whole. This frame includes a central tubular hub 2 which has the front diverging supporting legs 3, 3 and the rear diverging supporting legs 4, 4. Screwed into the outer ends of these legs and forming a part thereof are the

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bolts 5 and 6 whose heads form feet 7 and 8 which rest against the inside of the pipe 9, whose end is to be ground. The legs are thus made adjustable in length so that the frame may be accommodated to pipes of different diameters. Upstanding from the hub 2 there is a centering leg which is formed of the tube 10, which may be welded to the hub, and the rod 11 therein, screwed into the outer end of which there is the bolt 12 forming part of the centering leg and whose head forms a foot for the centering leg to rest against the inside of the pipe. Opposite the tube 10 and formed integrally with the hub 2 there is a tubular housing 13 into which the inner end of the rod 11 extends. There is a lever 14 which is pivoted between the lugs 15, 15 depending from the hub and one end of this lever works through a slot 16 and has a spring seat 17 in the housing 13. A strong coil spring 18 is enclosed in the housing 13 and is interposed between the spring seat 17 and the opposing end of the rod 11.

Between the legs 3 and anchored thereto there is a web 19 provided with a J-slot 20 whose lower end is turned laterally. The outer end of the lever 14 extends through the J-slot 20 and may be engaged in the laterally turned lower end thereof to place the spring 18 under compression so as to hold the outer end of the rod 11 firmly but yieldingly against the inner side of the pipe 9 to anchor the frame in place.

When it is desired to remove the frame from the pipe the outer end of the lever 14 may be unseated from the laterally turned end of the J-slot and moved radially inwardly thus relieving the spring pressure against the rod 11 and releasing the frame from the pipe 9.

The numeral 21 designates the grinder frame which is preferably formed of an angle iron. A spindle 22 is secured to one leg of the grinder frame and may be fitted into the forward end of the hub, as shown in Figure 1 and rotated therein. The other leg of the frame 21 has a bearing 23, perpendicular to said leg and a rod 24 is fitted through this bearing 23 and clamped securely in place by the upper and lower clamp nuts 25 and 26 which are screwed onto the rod 24.

The upper end of the rod 24 is formed into a hinge plate 27 whose forward end is provided with a slot 28. There is a bearing housing 29 secured to and depending from which there are the hinge plates 30, 30 which are spaced apart and which embrace the hinge plate 27 and are pivoted thereto by the bolt 31. The hinge plates

30 are extended forwardly, as shown in Figure 1, and the clamp bolt 32 extends through them and through the slot 28 and holds the bearing housing 29 in a selected relation to the pipe end.

Mounted to rotate in the bearing housing 29 there is the shaft 33 clamped on the inner end of which, by the clamp nut 34, there is the grinding disc 35 having an abrasive face 36 directed toward the end of the pipe 9. The shaft 33 may be driven in any preferred manner. As shown its outer end is connected to an electric motor 37 by means of a flexible driving shaft 38. As the disc 36 is driven it is held against the opposing end of the pipe 9 and is revolved about the hub 2 so that it will come into frictional contact with the end of the pipe 9 all the way around. It will thus remove all foreign matter from the end of the pipe as well as grind it down smooth.

If it be desired to form a beveled end on the pipe 9 the clamp bolt 32 may be loosened and the angle of the disc 35 varied to the desired degree relative to the pipe 9 and the clamp nut then again tightened to maintain said angle. As the work progresses the frame 21 and grinding disc may be forced inwardly against the work, the spindle 22 moving inwardly in the hub 2.

When the work is completed the frame 21 and the appendants thereon may be removed by simply withdrawing the spindle 22 from the hub and the frame 1 can then be detached from the pipe 9 as hereinabove explained.

Referring to the embodiment shown in Figure 4 the frame 1 is mounted in the pipe 9 in the same manner as shown in Figure 1 with the forward end of the hub 2 projecting forwardly beyond the pipe end. However, in this form there is an elongated hub bearing 39 mounted to rotate on the forwardly projecting end of the hub 2. Upstanding from the bearing 29 there is a sleeve 40 whose upper end carries the clamp nut 41 through which the lower end of the rod 24 is screwed. This rod 24 supports the grinding disc 35 in the same manner as illustrated and described in connection with Figure 1. The disc may be driven from the motor 37 through the flexible shaft 38 and the disc 35 may be revolved as it is rotated by means of the handle 42 which is attached to and which depends from the bearing 39.

Referring now to the embodiment illustrated in Figure 5 there is a frame 1a adapted to be inserted and supported in the pipe 9. This frame includes an elongated tubular hub 2a which has the front downwardly diverging legs 3a, 3a and the rear downwardly diverging legs 4a, 4a. These legs have the bolts 5a, 5a and 6a, 6a screwed therein forming part thereof whose outer ends have the heads 7a, 7a and 8a, 8a thereon forming feet which rest against the inside of the pipe. Extending transversely through the hub 2a there is rectangular bearing 43 in which the plate-like centering leg 44 is slidable, the outer end of said plate-like leg being inwardly beveled as at 45. The bearing 43 has a rear opening 46 and opposite this opening the centering leg 44 is provided with a notch 47. Within the hub 2a behind the centering leg there is an anchor block 49 which is secured in place by set screws 50, 50. A strong flat spring 51 is anchored, at one end, to the block 49 and its other end projects into the notch 47 and urges the centering leg 44 outwardly against the inner wall of the pipe 9 so as to hold the hub 2a centered in the pipe. The outer end of the centering leg 44 is beveled so as to auto-

matically retract said leg when the frame 1a is inserted in the pipe 9.

There is a bushing 52 in the forward end of the hub 2a in which the spindle 53 is mounted to rotate. The outer end of this spindle has a transverse tubular head 54 through which the rod 55 is extended and in which it is clamped by the clamp nuts 56, 56 which are threaded onto said rod. The outer end of the rod 55 carries the hinge plate 57, similar to the plate 27 and whose forward end is provided with a transverse slot 58. There is a bearing housing 59 and formed integrally therewith are the spaced hinge plates 60, 60 which embrace the plate 57 and are pivoted thereto by the bolt 61. The hinge plates 60 are extended forwardly, as shown in Figure 5, and there is a clamp bolt 62 which extends through them and through the slot 58 and holds the bearing housing 59 in a selected relation to the pipe end.

Mounted to rotate in the bearing housing 59 there is a shaft 63 which is mounted to rotate on the anti-friction bearings 64, 64 and clamped on the inner end of the shaft 63, by the clamp nut 65, there is a grinding disc 66 having an abrasive face 67 which is in frictional contact with the end of the pipe 9 when the grinding machine is in operation. The shaft 63 may be driven in any preferred manner as by a motor, as shown in Figures 1 and 4. The grinding disc may be adjusted to form a beveled end on the pipe 9, as shown in Figure 5.

It may be here stated that the shaft 33, shown in Figures 1 and 4, is mounted to rotate on anti-friction bearings in the same manner as is illustrated in Figure 5.

As the disc 66 is rotated it may be also revolved about the spindle 53 so as to grind the end of the pipe all the way around.

As hereinbefore indicated the spindle 22 is longitudinally movable in the hub 2; also the bearing 39 is mounted to move longitudinally, as well as to rotate on the hub 2 and the spindle 53 is mounted to move longitudinally as well as to rotate in the hub 2a so that the grinding disc, in each embodiment, may be readily moved toward and maintained in grinding contact with the end face of the pipe being operated on.

In each of the forms the yieldable centering leg is spaced longitudinally between the end legs of the supporting frame 2, or 2a, as the case may be and are also so located as to bear against the inside of the pipe opposite the diverging legs 3, 4 or 3a, 4a, as the case may be, so that the frame on which the grinding disc is mounted to revolve will be held stationary in the pipe during the grinding operation.

The form of machine shown in Figure 1 is more suitable for grinding pipe of large diameter while the forms shown in Figures 4 and 5 are more suitable for pipes of smaller diameter although it is obvious that either form of the machine may be made to operate on either small or large pipes.

What I claim is:

1. A grinder for the end face of a pipe comprising; a frame adapted to be inserted into the pipe end and including a central, elongated hub and series of supporting legs carried by the hub and spaced apart longitudinally of the hub and the legs of each series diverging from the hub and an intermediate centering leg carried by the hub and spaced from said series longitudinally with respect to the hub, said intermediate leg being located in a different longitudinal, radial plane from that of either of the other legs, the

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outer ends of said legs being engageable with the inside of said pipe to support the hub in axial relation with the pipe; resilient means in the frame associated with one of the legs and arranged to hold the outer end of the corresponding leg in yieldable engagement with the pipe; an abrading member; means in telescopic relation with the hub and mounted to revolve relative thereto and on which the abrading member is mounted whereby said abrading member may be revolved about the axis of the pipe in contact with the end face of the pipe and means for rotating the abrading member.

2. A grinder for pipe ends comprising; a frame adapted to be inserted into a pipe and including an elongated central hub and series of legs thereon which are spaced apart longitudinally of the hub and the legs of each series diverging out-

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wardly from the hub and an intermediate leg spaced, longitudinally of the pipe, from each series and located in a different longitudinal, radial plane from that of either of the other legs, the outer ends of said legs being positioned to engage the pipe walls to hold the hub centered in the pipe and one of said legs being radially slidable through the hub; yieldable means in the frame for holding said slidable leg yieldingly against the pipe; an abrading member; means mounted in telescopic relation with the outer end of the hub and on which the abrading member is supported, said supporting means being mounted to rotate about the hub whereby the abrading member may be revolved about the axis of the pipe in contact with the end face of the pipe and means for rotating the abrading member.

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