Jan. 27, 1948. R. B. PEALER 2,435,156

ABRASIVE CUT-OFF MACHINE

Filed Oct. 6, 1945 4 Sheets-Sheet 1

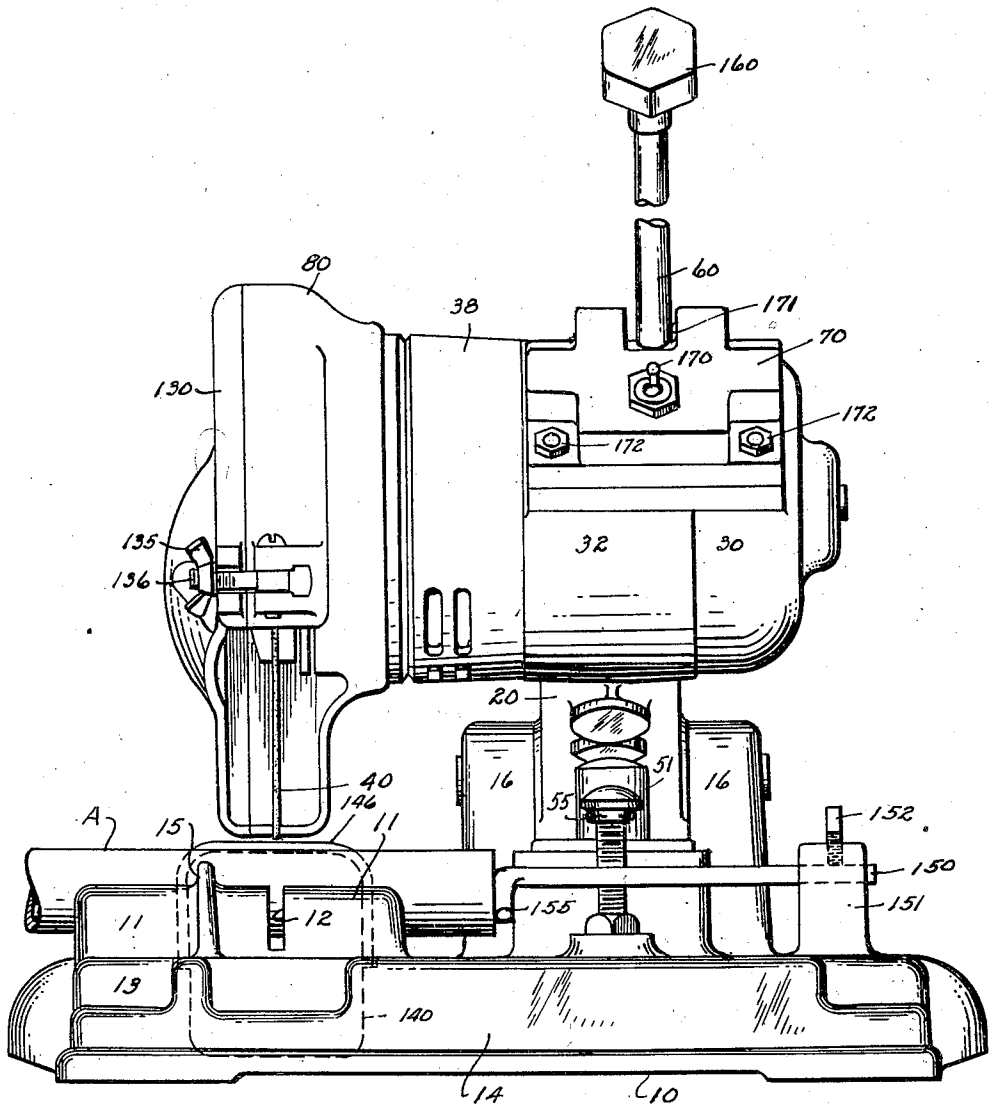


FIG. 1

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ABRASIVE CUT-OFF MACHINE

Filed Oct. 6, 1945 4 Sheets-Sheet 2

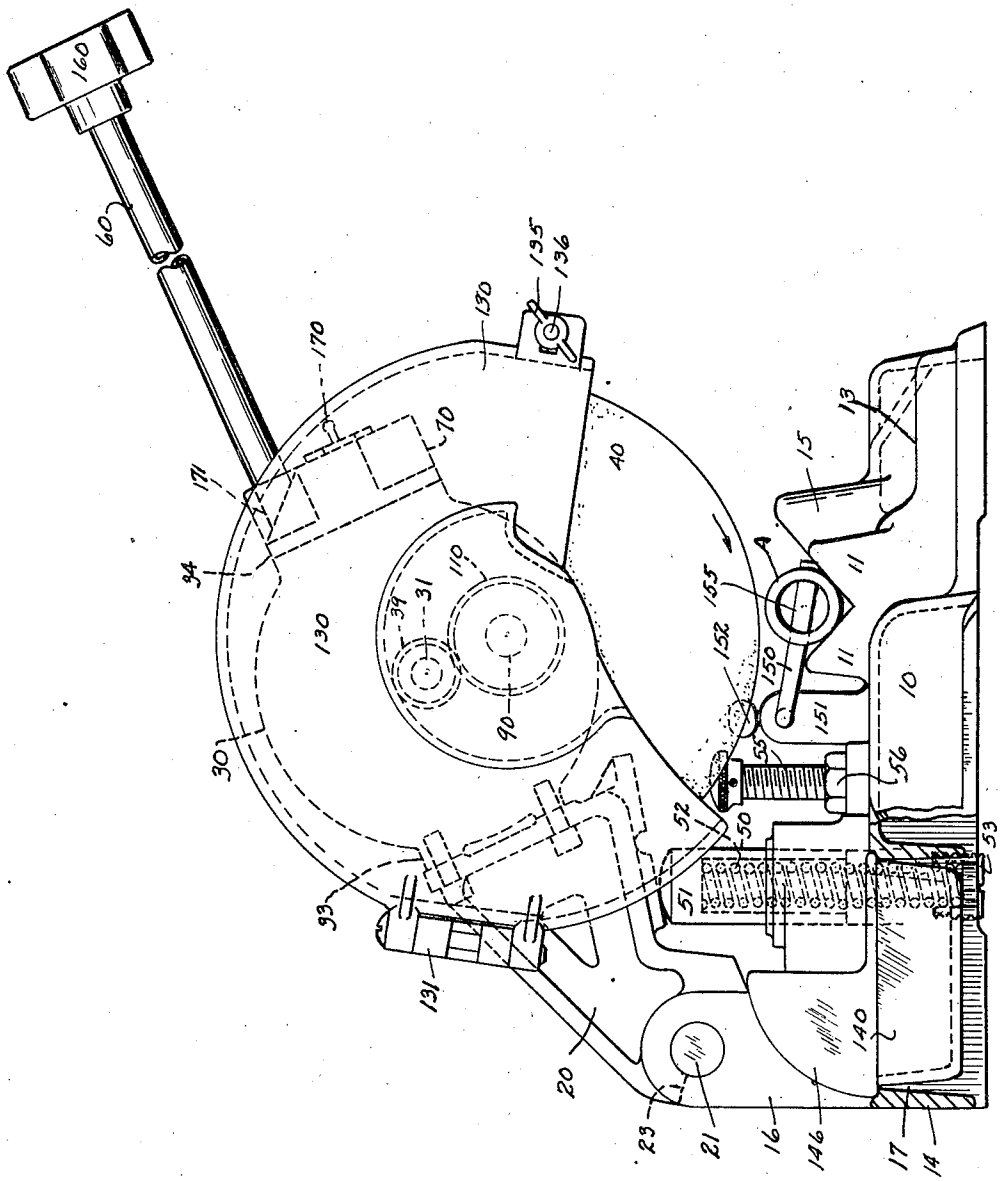


FIG. 2

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ABRASIVE CUT-OFF MACHINE

Filed Oct. 6, 1945 4 Sheets-Sheet 3

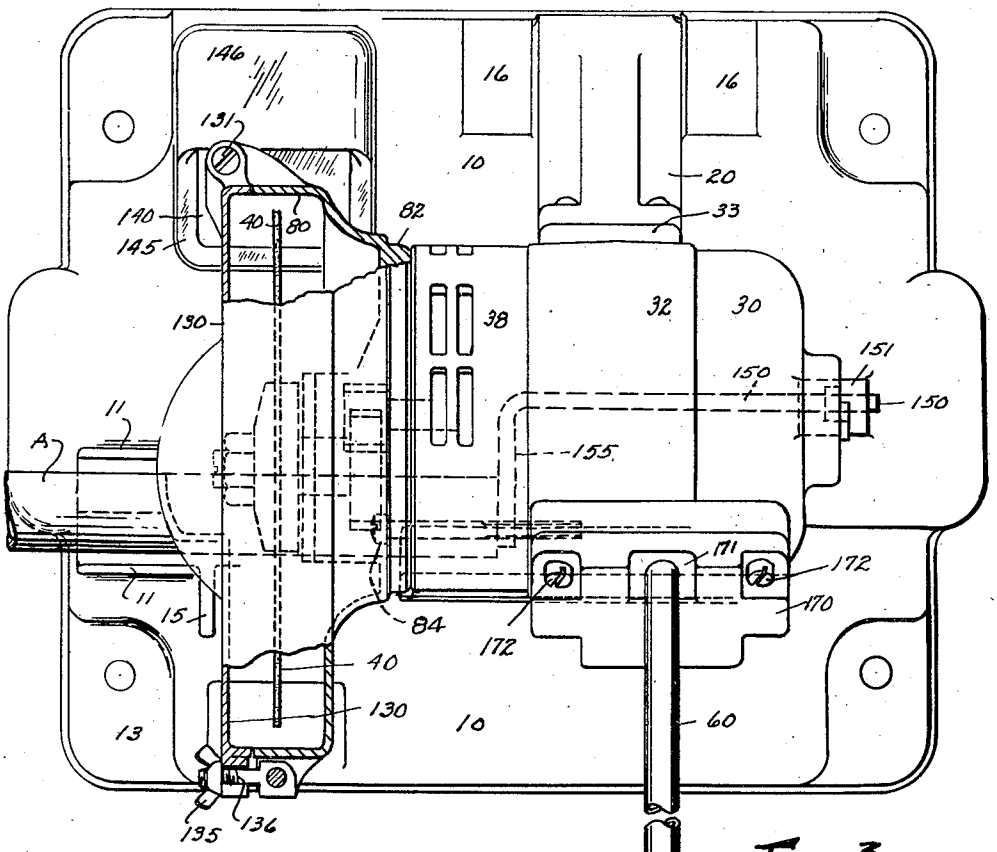


FIG. 3

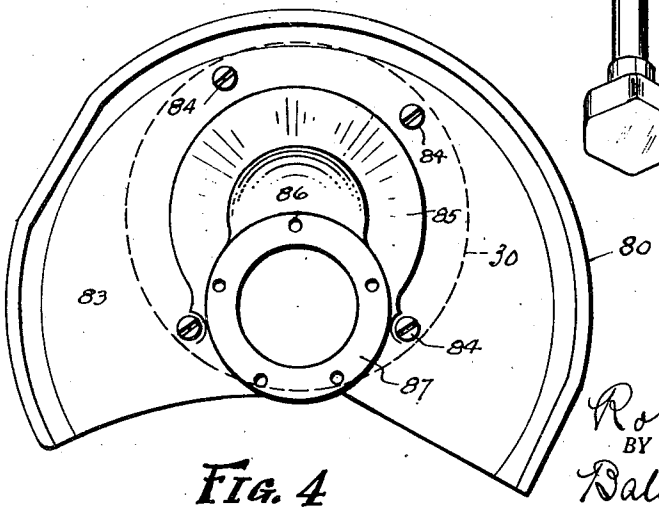


FIG. 4

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ABRASIVE CUT-OFF MACHINE

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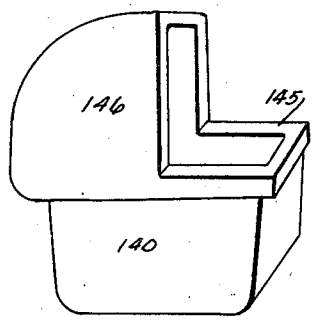


FIG. 7

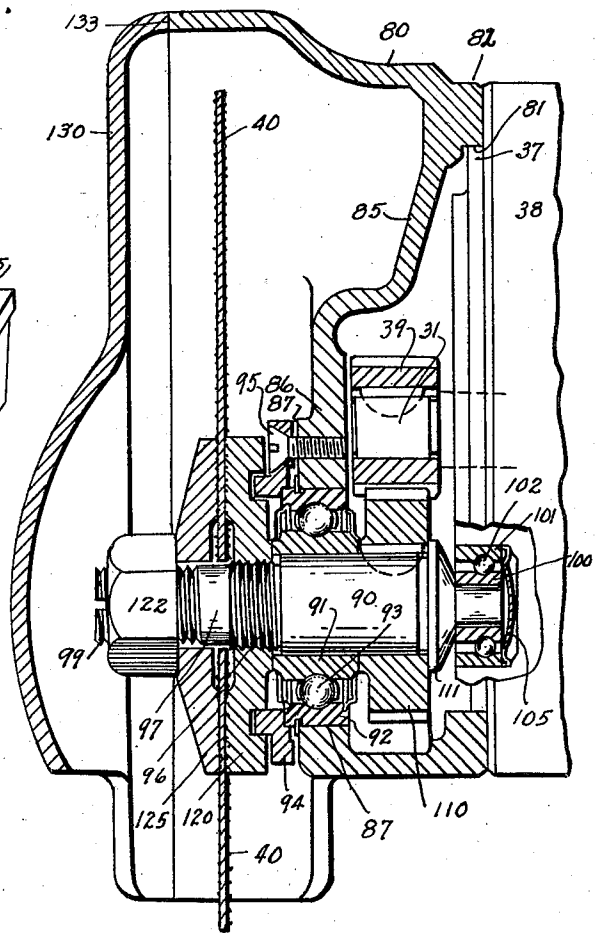


FIG. 5

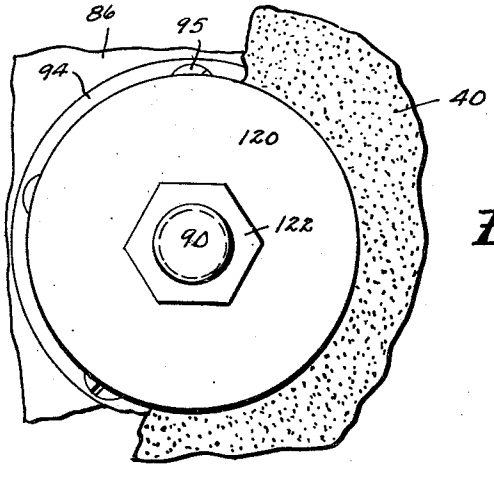


FIG. 6

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2,435,156

UNITED STATES PATENT OFFICE

2,435,156

ABRASIVE CUTOFF MACHINE

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Application October 6, 1945, Serial No. 620,754

2 Claims. (Cl. 51—98)

1

This invention relates to an abrasive cut-off machine of the type which has a base carrying means for positioning the work to be cut off, an arm pivotally carried by the base, a motor mounted on the arm and an abrasive disc operated by the motor. The general object of the invention is to provide such a machine in an extremely simple and at the same time efficient form.

Among the particular objects of the invention are provision for efficient gearing between the motor shaft and the disc to give proper speed to the disc; provision of means for quenching the sparks resulting from the abrasion; provision of a suitable operating handle and electric switch adjacent the handle for convenient operation, and provision of a suitable gauge to locate readily the work to be cut. These various features will be hereinafter more fully described in connection with a preferred embodiment illustrated in the drawings.

In the drawings, Fig. 1 is a front elevation of my machine; Fig. 2 is an elevation partly in section looking at the left hand end of Fig. 1; Fig. 3 is a plan of the machine partly broken away; Fig. 4 is an elevation of the casing for the disc and gearing; Fig. 5 is a section on a larger scale through the axis of the disc shaft; Fig. 6 is a face view of the clamp for the disc; Fig. 7 is a perspective of the trough for carrying quenching liquid.

I will first describe the general characteristics of the machine shown in the drawing and then take up the particular features with which my invention is concerned.

In the drawings, 10 indicates a base of special form as hereinafter described in detail; 20 an arm pivoted at the rear to the base so as to be movable in a vertical plane; 30 a motor carried by the arm and 40 an abrading disc rotated by the motor. Mounted in the base is a spring device 50 acting upwardly, as hereinafter explained, against the arm, and counter-balancing the weight of the motor and arm to maintain the arm normally in its uppermost position, as indicated in Fig. 2. The arm is provided with a handle 60 adapted to be grasped by the operator, who may at the same time operate an electric switch to energize the motor and then swing the motor and rotating disc downwardly to bring the disc into engagement with the work held by the operator's other hand in a work positioner 11, carried by the base.

I will now describe more specifically the construction of the different elements outlined.

2

The base 10 comprises a substantially rectangular member having a table-like top portion, flat for the most part, and suitable downwardly extending edge flanges 14 and bracing internal webs. The work positioner comprises a pair of longitudinal ridges interrupted by a cross groove 12, which the abrading disc may enter in cutting off an article resting in the V-shaped channel provided by the ridges. Such an article is indicated at A in Figs. 1 and 2 as a pipe or rod.

The front left hand corner of the base is preferably lowered at 13 to provide space from the operator's hand to grasp the article in the V-shaped work positioner and an upstanding web 15 forms a thumb guard preventing the thumb of his left hand from reaching the region of the cross grove 12. At the rear, the base carries a pair of ears 16, which form the support for a cross shaft 21 on which the motor-carrying arm 20 is mounted.

The swinging arm 20 is bolted at its forward end to the motor casing 30 to which the handle 60 is secured. The arm, motor frame and handle thus constitute in effect a single rigid member pivoted to the base. As shown in the drawings, the motor frame has an annular boss 32 which is formed in diametrically opposite regions into flat pads 33 and 34. The arm 20 is bolted to the pad 33. The pad 34 receives the handle and carries the casing 70 for the motor switch.

I have mentioned the spring device 50 which normally holds the arm 30 and the motor in elevated or idle position. This is best shown in Fig. 2. As there appears, this device comprises a downwardly facing cylindrical cup 51 which is vertically slidable in the base, the helical compression spring 52 occupying such cup and seated on a suitable plug 53 screwed into the base. The plug enables adjustment of the spring 52 so that the force of the spring is enough to more than counter-balance the weight of the arm 20 and the motor and other parts carried by the arm, resulting in the arm being normally held in its uppermost position. In this position a flattened portion 23 (Fig. 2) on the arm engages a flattened top of a web between the base standard 16, thereby limiting further upward movement of the arm.

I provide adjustable means to limit the downward movement of the swinging arm as, for instance, a headed screw 55 threaded in a boss on the base and locked by a jam nut 56.

Coming now to the particular features with which my invention is concerned, I will first de-

scribe the special gearing I employ between the motor 30 and the abrasive disc 40.

The motor has an armature shaft 31 projecting beyond the left hand end of the motor and carrying a driving pinion 39, Figs. 3 and 5. I secure to the end of the frame of the motor 30 a specially formed housing 80 which encloses the pinion 39 and the gear driven thereby and provides a grease receptacle therefor and also houses the major portion of the abrasive disc 40. This housing is best shown in Figs. 3, 4 and 5. It has an open outer face normally closed by a hinged cover 130 as hereinafter described. At the inner end the housing is substantially cylindrical as at 81 and surrounds a positioning boss 37 on the motor frame.

The inner end of the housing 80 comprises an annular thickened portion 82 through which pass screws (one of which is shown at 84 in Fig. 3) into the motor frame. The inner wall or partition of this casing is diverted outwardly in an approximately conical form 85 to lead to a flat region 86 parallel with the plane bounding the inner end and having an annular flat seat 87 with its axis offset from the axis of the armature shaft 31.

The motor preferably has a ventilation casing 38 with air exhaust vents, and the screws 84 which hold the gear casing to the motor may lie within the ventilation casing and be threaded into the motor frame proper (as indicated in dotted lines in Fig. 3) thus binding all of these members together.

The abrasive disc 40 is clamped on a driven shaft 90 which is journalled in the housing portion 86 and also in the end of the motor frame. I have shown this journalling as being effected by a pair of ball bearings. Thus, there is a main inner annular raceway 91 snugly surrounding the shaft 90. Outside of this a cooperating raceway 92 is secured to the housing, and between the two is a row of balls 93 preferably embraced by a ball retainer between suitable grease washers. Mounted on the housing seat 87 is a ring 94 which bears against the outer raceway 92 and is held in the housing by screws 95 and thus effectively clamps the outer raceway to the housing while enabling the removal of this outer raceway with the rest of the bearing and the shaft if desired.

The other bearing for the driven shaft comprises an inner raceway 100 tight on a reduced extension 96 of the shaft, an outer raceway 101 set into a recess in the motor frame against a disc spring 105 and a row of balls 102 between the two raceways. The bearings described provide a very efficient anti-friction support for the driven shaft 90.

Keyed to the driven shaft 90 between the two ball bearings is a gear 110 meshing with the pinion 39 on the armature shaft. This gear abuts a collar 111 on the shaft 90 and is retained against longitudinal shifting by the inner raceway 91. The extreme diameter of this gear is slightly less than the opening in the housing occupied by the outer raceway 92. Accordingly, removal of the clamping ring 94 allows the removal as a unit of the shaft with both of its bearings and the driven gear. This provides for ready assemblage of the parts and likewise for ready removal for repair and replacement.

The shaft 90 is provided with an external thread 96 on which is mounted a disc 120 which is screwed tight against the inner raceway 91, and

provides an abutment for the abrasive disc 40. This disc has a central opening snugly fitting a cylindrical portion 97 of the shaft outwardly of the thread 96. Loosely surrounding the shaft on the outer side of the abrasive disc is a metal clamping disc 125 and beyond this is a nut 122 screwing onto a thread 99 on the shaft. The tightening of this nut causes the disc 125 to clamp the abrasive disc 40 against the abutment disc 120 thereby effectively holding the abrasive disc on the driven shaft but allowing its ready removal by the removal of the nut 122 and the clamping disc 125.

It will be seen that the bearing and driving provisions described enable the mounting of the abrasive disc comparatively close to the end of the armature shaft and the pinion thereon and provide a very accurately journaled readily rotatable driven shaft of short dimensions to carry the driven gear and the disc. As already described the construction enables the ready removal of the disc from time to time for replacement and the ready removal of the shaft with its bearings and gear whenever necessary without disturbing the housing attached to the motor frame.

If necessary when the shaft with the bearings and gear are withdrawn, the larger bearing may be readily removed over the threaded end of the shaft, and the smaller bearing removed in the opposite direction.

In use, the disc is partially covered on the outer side by a cover plate 130 hinged at 131 to the housing 80 and having an edge wall 133 abutting the housing and being of substantially cylindrical form for the major portion of its extent. The covering is held to the housing in a region diametrically opposite the hinge by a wing nut 135 screwing onto a bolt 136 hinged to the housing and in use occupying a notch in the cover. The mere loosening of the wing nut allows the bolt to be swung aside and then the cover swung to open the housing, allowing access to the disc.

In the operation of my abrasive cut-off machine, a continuous shower of sparks results, which pass to the rear of the pipe in the region where the disc is operating. I provide means to catch the greater part of such incandenscent particles as they pass to the rear of the pipe and immediately quench them, thus producing a safer and more cleanly operation of the machine.

The means for quenching the sparks comprises a specially formed water trough 140 mounted on the frame directly at the rear of the pipe and disc. This water trough comprises a body portion of rectangular form having side walls, end walls and a base, then an open ledge 145 above the body portion and a hood portion 146 having side walls and a top and rear wall leading upwardly from the ledge. The top wall curves downwardly from an open front of the hood for about a quadrant.

The water trough, as shown, occupies an opening 17 in the base and is supported by the shoulder or ledge 145 resting on top of the base, as shown. The trough is adapted to contain water practically up to the ledge. In operation, the sparks passing rearwardly enter the hood and engage the curved top wall thereof, are immediately deflected downwardly into the water in the trough. This not only effectively quenches the sparks but collects the flying particles of the disc and article, so that they may be readily discharged.

To form a simple and at the same time effec-

tive gauge for the article to be cut, I provide an L-shaped bar 150 slidably mounted in a suitable standard 151 rising from the base and clamped by a thumb screw 152. The standard and bar are out of alignment with the V-shaped trough provided by the stationary guides, the standard 151 being preferably back of the line of the article to be cut.

Figs. 1 and 2 indicate at A a pipe to be cut, this pipe resting in the stationary guides. The L-shaped end portion 155 of the gauge is positioned so that it will be abutted by the end of the pipe and accordingly thus locates the cutting region so that just the desired length of the pipe will be cut off. The gauge may be shifted to vary this distance by merely loosening the thumb screw 152.

If a longer length of pipe is desired to be cut off than is possible with the gauge extending to the left of the standard 151 as shown, the gauge may be entirely removed from the standard and turned the other end around and inserted from beyond the right hand end of the machine.

The operating handle 60 is preferably a section of pipe screwing at its inner end into the motor casing and carrying at its outer end a suitable hand knob 160. This enables the ready removal of the handle for shipping or storage purposes.

The switch casing 70 secured to the pad 34 on the front of a motor frame is a hollow block carrying within it suitable switch mechanism operated by a forwardly projecting finger lever 170. The pad 70 is preferably recessed at the top, as shown at 171, so that it may straddle the operating handle screwed into the motor casing and may be removed without disturbing the handle, the switch housing being held in place by four nuts or screws 172 screwing into the housing. The electric supply conductor (not shown) leads to the space within the switch housing 70 preferably from the right hand end of the machine. Any form of switch may be used, but I prefer to employ a switch which opens or closes both leads from the supplying conductor.

I claim:

1. In an abrasive cut-off machine, the combination of a base having a top portion with edge flange and an upright standard, an arm pivoted to the standard, a motor mounted on the arm, means on the arm for carrying an abrasive disc and means for driving it by the rotation of the armature of the motor, said base having a hole through its top, a removable receptacle for sparks mounted in said hole and having a shoulder engaging the top of the base.

2. In an abrasive cut-off machine, the combination of a base, an arm pivotally carried thereby, a motor on said arm, means for carrying an abrasive disc operated by the motor, said base having an upwardly open recess and a receptacle for sparks mounted in said recess and comprising a trough with impervious bottom and side and end walls and an outwardly projecting ledge at the top of said trough and a hood extending upwardly from the ledge having side walls and a curved top, said side walls of the hood being materially shorter than the length of the water trough whereby the trough is open upwardly in front of the hood and the hood open at the back of the front edge of the trough.

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