

June 12, 1945.

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2,378,017

SHAPE BURNER

Filed March 20, 1944

2 Sheets-Sheet 1

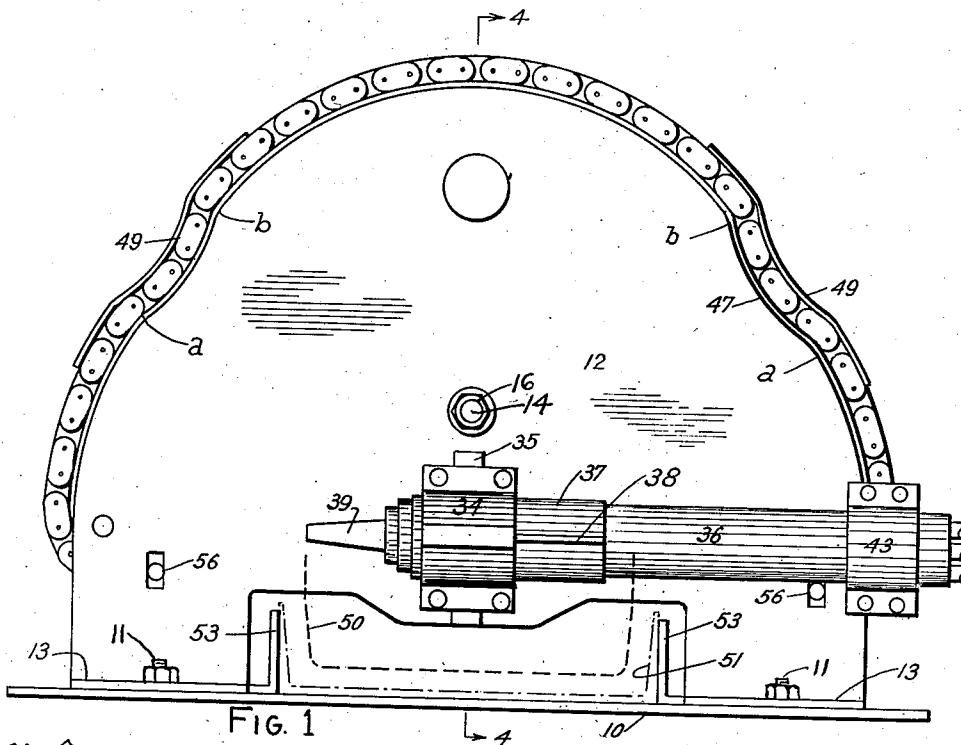


FIG. 1

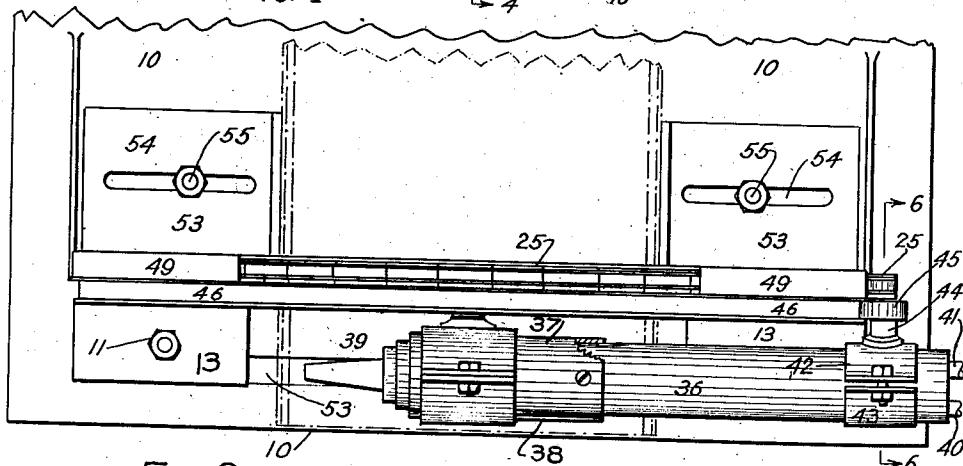


FIG. 2

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2 Sheets-Sheet 2

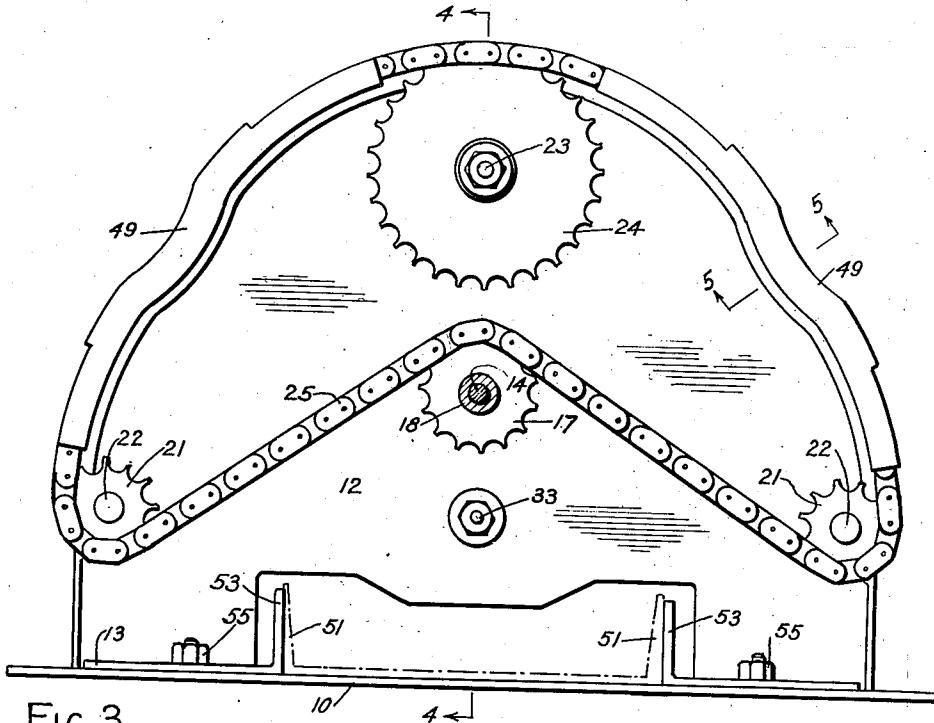


FIG. 3

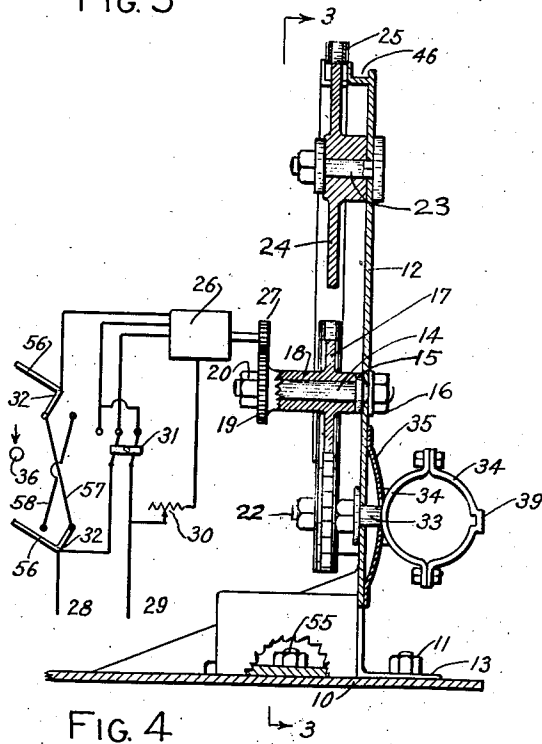


FIG. 4

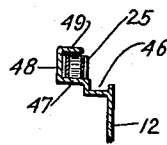


FIG 5

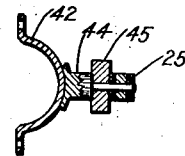


FIG. 6

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SHAPE BURNER

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2 Claims. (Cl. 266—23)

This invention relates to improvements in shape burners.

In places where structural steel is cut for use in various structures; it is necessary to cut steel channels, I-beams, angles and Z-bars into certain lengths. This cutting operation has, heretofore, been performed, either by means of a friction saw, or by a hand controlled oxy-acetylene torch.

It is the object of this invention to produce a machine or tool by means of which a cutting torch can be controlled in its operation as to position, direction and speed of movement in such a way that its operation will entail the least amount of effort on the part of the operator and which can always be depended upon to make a straight cut at right angles, or at any other angle, with respect to length of the member being cut.

This invention, briefly described, consists of a support on which the channel or other structural steel member rests and which is provided with a stop positioned to determine the length to be cut. Secured to the support is a motor that can be controlled both as to direction and speed of operation. Attached to this motor support is a frame having a burner carrying guide pivotally connected therewith. This frame is also provided with a track member that cooperates with suitable means carried by the burner for moving the latter longitudinally in the burner guide and for determining its longitudinal position relative thereto, at every point in the rotary movement of the burner about its pivot. Means comprising a chain, gear or other equivalent mechanism is provided and interconnected with the motor in such a way that the motor turns the burner guide and burner about its pivotal connection with the frame, limit stops being provided so as to guard against over travel of the burner during operation.

Having thus briefly described the invention, the same will now be described in greater detail and for this purpose reference will be had to the accompanying drawings in which the invention has been illustrated, and in which:

Figure 1 is a front elevation of the mechanism embodying my invention;

Figure 2 is a top plan view thereof;

Figure 3 is a rear elevation;

Figure 4 is a partial section taken on lines 4—4, Figures 1 and 3 and shows some of the parts diagrammatically, the burner having been omitted for the sake of simplicity;

Figure 5 is a section taken on line 5—5, Figure 4; and

Figure 6 is a section taken on line 6—6, Figure 2.

In the drawings reference numeral 10 designates a base on which the mechanism is supported and to which it is secured by some suitable means such as bolts 11. The mechanism comprises a frame 12 which, in the present embodiment, is formed from a steel plate. The frame is provided at its lower end with flanges 13 and when secured to the base is held in rigid relation therewith. Secured to the frame is a stub shaft 14 which has been shown as provided with a collar 15 and a clamping nut 16. Mounted for rotation on shaft 14 is a sprocket wheel 17 to the hub 18 of which a spur gear 19 is secured. The gear is held in position by means of a nut 20 or some other suitable means. Rotatably connected with the frame near the outer lower corners thereof are two sprocket wheels 21 that are mounted for rotation on stub shafts 22. Another and larger sprocket wheel is mounted for rotation on stub shaft 23 and has been designated by reference numeral 24. A sprocket chain 25 is in operative engagement with all of the sprocket wheels in the manner shown in Figure 3.

Referring now to Figure 4, reference numeral 26 designates a motor to the drive shaft of which a pinion 27 is secured. This pinion is in mesh with the spur gear 19 and therefore whenever the motor operates it turns the sprocket wheel 17 and as a result it moves the chain in a direction corresponding to its direction of rotation. The supply line to the motor has been designated by the two conductors 28 and 29. Reference numeral 30 designates a field rheostat by means of which the speed of the motor is controlled, and reference numeral 31 designates a reversing switch, while reference numerals 32 designate limit switches to which reference will be hereinafter made. Mounted for rotation with respect to the base and secured thereto by means of a bolt 33, is a burner clamp 34. A resilient member such as a spring 35 is positioned between the clamp 34 and the outer surface of the frame so as to provide a friction mechanism that gives a certain amount of resistance to rotation and also holds the clamp in a predetermined position with respect to the frame. Positioned within the clamp is a burner body 36. This burner body is provided with a brass sleeve 37 that is held against relative movement. This is provided with a rib 38 that cooperates with a groove 39 in the clamp 34. The parts are so adjusted that the burner and sleeve can move in the clamp 34 in the direction of the axis of the burner. A tip 39 is se-

cured to the burner in the usual way and is connected by suitable pipes to the gas supply tubes 40 and 41 which, in turn, are connected with tanks containing acetylene and oxygen. Since the operation of oxyacetylene burners is well known, the actual construction of the burner and the connection between the gas supply tubes and the tip 39 will not be shown in detail.

A clamp comprising two members, one of which has been designated by reference numeral 42 and the other by reference numeral 43 are shown as secured to the outer end of the burner body. Extending rearwardly from member 42 is a stub shaft 44 that carries a roller 45. This shaft is connected in a suitable manner with the chain 25 and therefore when the latter moves, it will also impart a corresponding movement to the outer end of the burner.

Referring now to Figure 5, it will be seen that the outer edge of frame 12 is provided with a groove or track 46 for the reception of the roller 45. Paralleling the track 46 is a flange 47 that serves as a support or bearing for the inner surface of the sprocket chain. Flange 47 extends upwardly, as indicated at 48, and has a forwardly extending flange 49 that engages the outer surface of the chain, especially where the track is outwardly concave.

It will be seen from Figure 1 that the track 47 is composed of several different arcuate sections. The lower portion of each end of the track is outwardly convex and extends to point *a*. From *a* to *b* the track is outwardly concave and between the two points *b*, it is upwardly convex in the manner shown quite clearly in Figure 1. Since the track 46 parallels track 47, it is evident that the roller 45 that is attached both to the burner and to the chain, will follow a path that is determined by the shape and position of tracks 46 and 47 and since various portions of these tracks are spaced different distances from the center of the pivot 33 about which the burner turns, it is evident that the burner and the sleeve will move with respect to the clamp 34 in line with the axis of the burner.

In the present embodiment of the invention the track is of such size and conformation and so spaced with respect to the pivot about which the clamps 34 turn that the tip of the burner will follow the path 50, which has been indicated by a broken line in Figure 1. This path is determined by plotting the distance from the track to the end of the burner tip 39 on lines passing through the pivot 33. In the present embodiment, the structural form to be cut is a channel which has been designated by a dot and dash line 51 and the track has been selected so as to control the burner tip in such a way as to keep it at a comparatively equal distance from the upper surface of the channel during the cutting operation. The base 10 is provided with a transversely extending slot 52 through which the flame may project after it has cut the channel or other structural form.

The present invention, as above mentioned, has been illustrated in connection with a channel, but it is evident that any other section or shape can be cut and the position of the tip controlled by the same means, the shape of the track being plotted to conform to the path that is to be followed by the burner tip. In the present embodiment, the track is so positioned that the roller 45 is attached to the burner body near the outer end thereof, but it is evident that the same result can be obtained by a track that is smaller in di-

mension, in which case the position of the roller 45 must be moved closer to the clamp 34. It is also evident that the roller may be connected with the burner tip and follow a track conforming in outline to the path that has been indicated by reference numeral 50. In such a case the track could be formed by a slot cut in a piece of sheet metal or the burner could be forced against the surface of the track by any suitable means. From the explanation just given, it is to be understood that the particular position of the track and the roller 45 with respect to the burner body can be modified so long as the function is performed in a substantially similar manner.

For the purpose of guiding the channel or other form two guide brackets 53 have been provided. These may be cut from sections of angle iron and provided with transverse slots 54 through which the bolt 55 passes. The brackets 53 can thus be adjusted into any desired position.

In the drawings a sprocket chain 25 has been indicated as the means for turning the burner, but it is to be understood that any other suitable element can be employed: for example, a V-belt might be used and since the free end of the burner is connected directly to the flexible chain or driving member, a slight slippage, if such should occur, would not at all interfere with the successful operation of the machine.

It is evident that some means should be provided for stopping the operation at each end of the burner movement and for this purpose limit switches 32 have been provided. In Figure 1, the handles 56 of the limit switches have been shown as projecting through the frame 12 into the path of the burner in such a way that when the latter arrives at the end of its movement in either direction, it will open the switch. In Figure 4, the burner 36 has been shown as moving downwardly and when this engages the handle 56 of the lower limit switch, it opens the circuit through the conductor 57 and connects the switch with the lower end of conductor 58. This breaks the circuit to the motor and before the machine can be started, the operation must move the handle 56 of the upper switch downwardly, whereupon a circuit to the motor is reestablished. At the end of each movement of the burner the direction of rotation of the motor must be reversed and for this purpose a reversing switch 31 has been shown which may be connected with the limit switches, if desired, in such a way that it will automatically move to the proper position at the end of each burner movement. In the drawings the reversing switch has been shown as manually operable. It is evident that various specific constructions might be employed for obtaining the automatic operation of this switch. In the machine as actually built, the field rheostat 30, by means of which the speed of the motor is controlled, is provided with a suitable handle, located conveniently, to permit the operator to vary the speed of movement as may be necessary to effect a satisfactory channel cutting operation. It is evident that when the burner moves from the position shown in Figure 1 it may move as fast as may be desired until the flame strikes the upper edge of the channel flange and after this the speed must be controlled so as to give ample time for cutting. It is evident that the burner should turn more slowly as the flame approaches the burner of the channel and that after this has been reached it may move faster until the opposite side is reached, whereupon the speed should be again reduced. Since motor speed con-

trols are old and well known, it has been shown in a more or less diagrammatic manner.

In addition to the specific means illustrated which comprises the sprocket chain 25 or a V-belt, it is also possible to transmit power to the burner by other mechanical equivalents, such as gears, and it is to be understood therefore that the specific means illustrated for moving the outer end of the burner is not to be considered in a limiting sense, but merely as illustrative of means for this purpose.

From the above description it will be apparent that the mechanism described herein and which forms the subject of this invention is of a simple and substantial construction and that by it the operation of an oxy-acetylene burner can be positively controlled as to direction and speed of operation. In the embodiment illustrated, the cut is made at right angles to the axis of the structural member, but it is to be understood that by properly inclining the member to be cut with respect to the plane of the frame 12, structural forms may be cut at any desired angle.

Having described the invention what is claimed as new is:

1. An oxy-acetylene shape burner for cutting beams and the like, comprising a base, a frame secured thereto, a burner guide pivoted to the frame, a burner slidably connected with the guide,

a track element on the frame, said track having different portions thereof spaced different distances from the pivot, a chain movably associated with the track, means for constraining the chain to follow the track, means for interconnecting the outer end of the burner with the chain, and means for moving the chain along the track, whereby the burner will turn about the pivot and slide relative to the guide in response to the track contour.

2. A shape burner comprising a base, means for positioning a structural element thereon, a frame secured to the base, a burner guide pivoted to the frame, a burner having a burner tip and slidably connected with the guide, the frame having a track forming a chain race, with portions thereof spaced different radial distances from the pivot, an endless chain positioned in the race, means for constraining the chain to follow the curvature of the race, means for moving the chain relative to the race, and means for attaching the outer end of the burner to the chain, whereby when the chain moves, the burner will be rotated about the pivot and simultaneously therewith moved longitudinally with respect to the guide in response to the variations in the radial distance from the race to the pivot.

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