J. F. RICHARDSON.

APPARATUS FOR CUTTING METALS.

APPLICATION FILED JULY 20, 1916.

1,359,530.

Patented Nov. 23, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

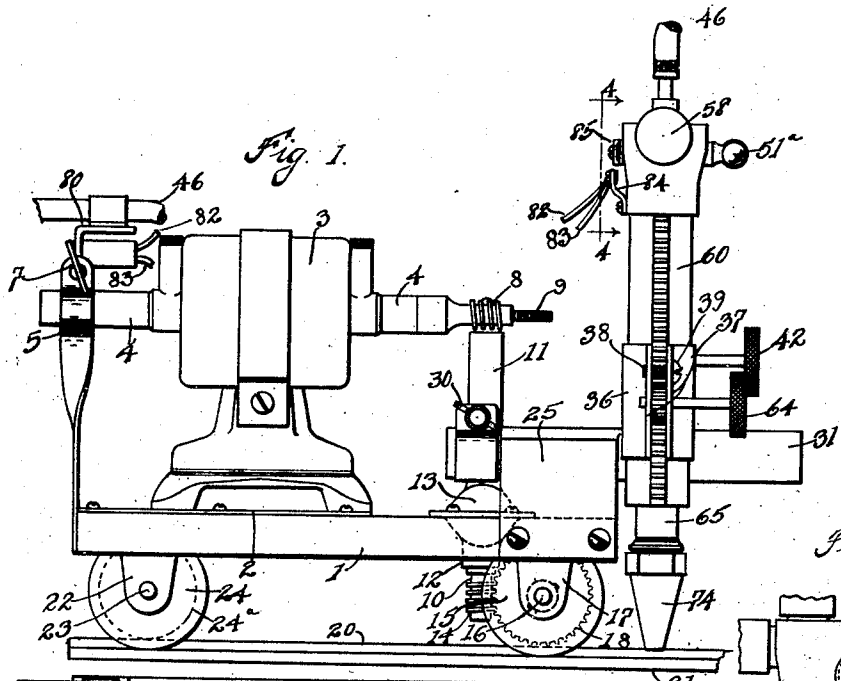
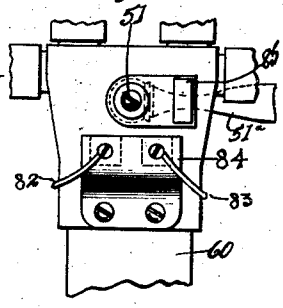


Fig. 4.



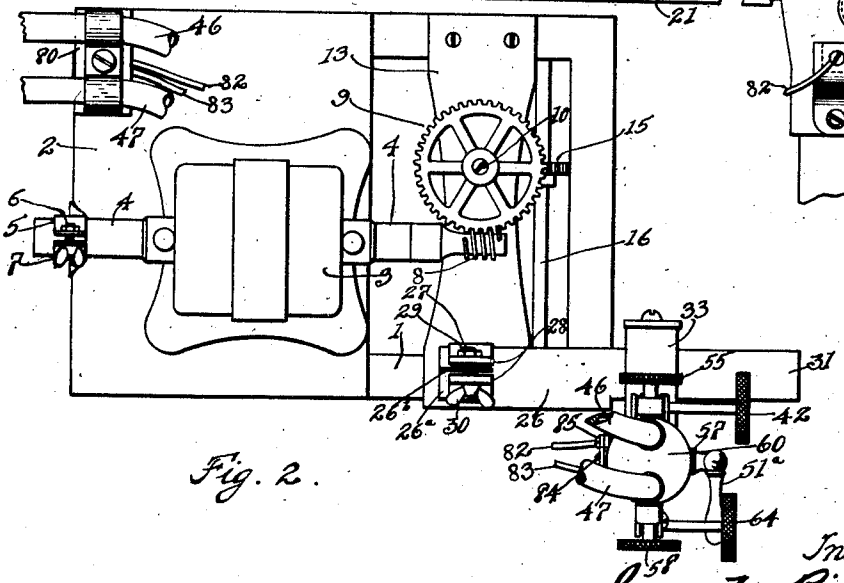


Fig. 2.

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2 SHEETS—SHEET 2.

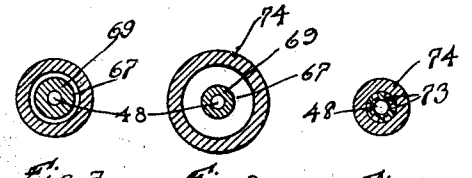


Fig. 7. Fig. 8. Fig. 9.

Fig. 3.

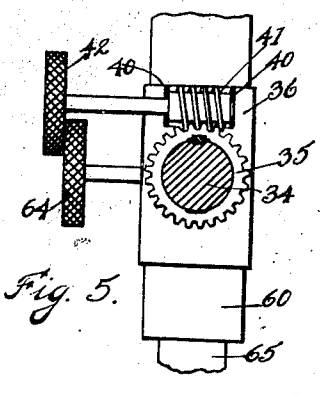


Fig. 5.

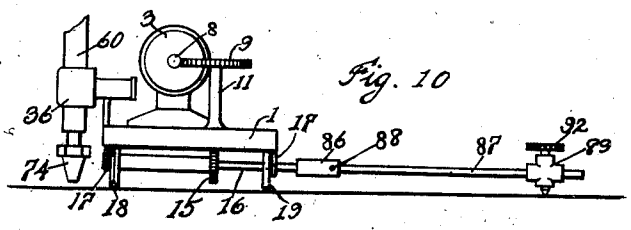


Fig. 10

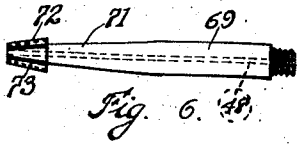


Fig. 6.

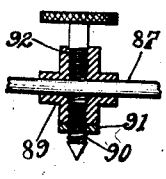


Fig. 11.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR CUTTING METALS.

1,359,530. Specification of Letters Patent. Patented Nov. 23, 1920.

Application filed July 20, 1916. Serial No. 110,382.

To all whom it may concern:

Be it known that I, JOHN F. RICHARDSON, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Apparatus for Cutting Metals, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to apparatus for cutting metals by means of oxygen, and has for its general object to provide an apparatus of this character which combines simplicity of construction and economy of production with efficiency and convenience of operation. The apparatus disclosed herein consists generally of a carriage whereon a cutting torch is adjustably mounted, with means for driving the carriage, and means whereby the carriage may be conveniently operated to make a straight or a curvilinear cut; also a form of torch which is particularly well adapted for use in, and as a part of, such apparatus.

In the drawings forming part hereof, Figure 1 represents a side elevation of the complete apparatus; Fig. 2 a top plan view of the same; Fig. 3 a view, partly in section and partly in front elevation; Fig. 4 a detail in elevation of the top of the cutting torch; Fig. 5 a sectional detail of the torch taken on the line 4—4 of Fig. 1 adjusting mechanism corresponding to line 5—5 of Fig. 3; Fig. 6 is an elevation of the inner tip member of the torch, Figs. 7, 8 and 9 are sectional details corresponding respectively to the like number of lines on Fig. 3; Fig. 10 is a detail in elevation illustrating the positions of the parts when the apparatus is used for cutting in a curvilinear line; and Fig. 11 a detail section of the pivot for the apparatus.

Describing by reference characters the various parts illustrated herein, 1 denotes the frame of the carriage, said frame carrying a plate 2 upon which is mounted an electric motor 3, said motor being a reversible variable speed motor adapted to be operated either by alternating or direct current. The motor shaft 4 extends at its rear end between the side members 5 of a friction brake, the brake being mounted on the carriage and having its upper ends connected by a bolt 6 threaded into one of the parts of the brake and shown as provided at its opposite end with a winged operating handle 7. At its forward end, the shaft 4 is provided with a worm 8 meshing with a worm gear 9 on a shaft 10 which is journaled within sleeve members 11 and 12 projecting respectively above and below a transverse supporting member 13 carried by the frame 1. At its lower end, the shaft 10 is provided with a worm 14 meshing with a worm gear 15 rigid with a shaft 16 which is journaled in brackets 17 depending from the frame and having the wheels 18 and 19 rigid therewith. The wheel 18 is provided with a V-shaped groove 18^a forming flanges that are adapted to coöperate with an inverted V-shaped rail 20 which may be carried by a suitable base 21. The wheel 19 has a flat tread.

At its rear end, the frame 1 is provided with a pair of depending brackets 22 similar to the brackets 17 and supporting a shaft 23 which has rigid therewith, in line with the wheel 18, a wheel 24 having a similar V-shaped groove, indicated at 24^a in dotted lines on Fig. 1.

Mounted on the front of the machine and at the side adjacent to the wheels 18 and 24 is a bracket 25 having a sleeve 26 extending longitudinally of the carriage and preferably integral with the bracket, said sleeve having a rearward extension 26^a provided with a slot 26^b, such rearward extension having a split clamp 27 thereon, said clamp having lugs 28 into one of which a bolt 29 is threaded, the bolt extending through the other lug and being provided with a rigid winged head 30.

31 denotes a cylindrical supporting member which is journaled within the cylindrical sleeve 26. This member is provided with a bracket 32 having a sleeve 33 supported thereby and preferably formed therewith. This sleeve forms a journal bearing for a shaft 34, such shaft having keyed thereto a worm gear 35, as indicated at 35^a and carrying at its outer end a split sleeve clamp 36 having a pair of flanges 37 united by a bolt 38 threaded into one of said flanges and having an operating head 39. The sleeve 33 is provided with a pair of lugs 40 which support the shaft of a worm 41, meshing with the worm gear 35, the shaft having an operating hand wheel 42.

The sleeve clamp 36 is thus journaled

within the sleeve 33 and is rotatably adjustable within the sleeve 33. The cutting torch is longitudinally adjustable within the sleeve 36. This torch will now be described. It comprises generally an upper or rear body with connections for supplying oxygen and a combustible gas thereto, valves controlling the supply of such gases, and passageways extending through such upper body; conduits extending from the upper or rear body to a lower or front body which is provided with passageways with which said conduits communicate and with a tip or nozzle coöperating with the last mentioned passageways; also a tubular member which connects the upper body with the lower body and which is slidably mounted within the sleeve 36, the sleeve 36 and the tubular connecting member having coöperating means whereby the torch as a whole may be reciprocated within the sleeve.

43 denotes the upper body, which is provided at its upper or rear end with connections 44 and 45 to which the flexible tubes 46 and 47 are respectively attached, said tubes conducting respectively oxygen and a combustible gas to the head. 48 denotes a central passageway extending from the bottom of the body to near the upper end of the same and there provided with a lateral branch 49, said branch constituting a chamber communicating with the connection 44 and the flexible tube 46 through a passageway 50. In the vertical passageway 48 there is located a valve 51 having a port 52 therethrough whereby the passageway 48 may be put into and out of communication with the chamber 49 and the oxygen supply tube 46. 53 denotes a second passageway for oxygen extending from a valve seat 54 in the chamber 49 to the bottom of the body 43, the passageway 53 being controlled by a needle valve 55 which coöperates with the valve seat. 56 denotes a passageway for combustible gas which is shown as extending diagonally through the body 43, the upper end of the passageway communicating with a chamber 57 in the body and controlled by a needle valve 58, said chamber communicating in turn, through the passageway 59, with the flexible supply pipe 47 for combustible gas. The lower end of the body 43 is shaped to receive snugly the upper end of the sleeve 60, which sleeve extends through the clamp 36 and is provided, between the lugs or flanges 37, with a rack 61 meshing with a pinion 62 on a shaft 63 which is journaled in said lugs and provided with a hand wheel 64.

Within the lower end of the sleeve 60, there is mounted the lower or front body portion of the torch, indicated at 65. This body is provided with a central passageway 66 extending from the top thereof to the upper end of an enlarged central bore 67, the upper end of said bore being reduced and internally threaded for the reception of the reduced threaded end 68 of the inner tip member. This inner tip member, below the reduced extension 68, has a body 69 which is of smaller diameter than the central bore in the body 65, whereby an annular chamber is provided therearound, this chamber communicating with a vertical passageway 70 extending therefrom to the upper end of the body. At its lower end, the inner tip member is tapered, as shown at 71, while the discharge end thereof is enlarged and tapered, as shown at 72, such enlarged portion being provided with a plurality of inwardly extending rectangular slots 73. 74 denotes the outer member of the tip, said outer member being so shaped as to fit snugly the body 72 at the lower end of the inner tip member and to form with the portion 71 of such member a chamber 75. This outer tip member is shown as threaded upon the lower end 76 of the lower body 65.

A tube 77 connects the lower end of the passageway 48 with the upper end of the passageway 66 and a tube 78 connects the lower end of the passageway 53 with the upper end of the passageway 70. The tube 78 is provided with an inclined branch 79 which communicates with the inclined passageway 56. The tubes 46 and 47 are conveniently supported on a bracket 80 projecting upwardly from the rear end of the carriage, said bracket having a clamp 81 for said tubes. The wires 82 and 83 for the motor are led to the head 43, where a switch 84, 85 is provided, one of the members of the switch being connected to the valve 51 (see Fig. 4) so that the circuit to the motor will be closed by operating the handle 51^a of the valve in such manner as to open the passageway 48 to the cutting oxygen. By this arrangement, the motor circuit will be closed and the carriage will be driven after the preheating operation and at the time when the oxygen is turned on for cutting purposes.

With the parts constructed and arranged as illustrated and described herein, the operation will be readily understood. The rail 21 can be placed on the work, where it is desired to cut a straight line, and the carriage will be overbalanced toward the work side thereof by the weight of the torch and its associated parts. By operating the hand wheel 42, the torch may be set at the desired angle with reference to the work, its distance from the work being regulated by means of the hand wheel 64. Combustible gas and oxygen will be supplied through the passageways or slots 73 by manipulating the valves 55 and 58. This mixture being ignited will preheat the metal to the desired extent after which the valve 52 will be open

and oxygen will be supplied to the passageway 48, tube 77, passageway 66, and the central passageway 69ª through the inner tip member.

When it is desired to make a circular cut, I employ means preferably such as shown in Figs. 3, 10 and 11. The shaft 16 is extended through the hub of the wheel 19 whereby it may receive a sleeve 86 within which a rod 87 extends, the rod being connected to the sleeve by means of a pin 88. A T casting 89 having intersecting bores arranged at right angles to each other, is slipped upon the rod. In one of the branches of this T there is threaded the pivot 90, a lock nut 91 being provided to secure the pivot at any desired position; in the opposite branch of the T is located the clamping screw 92 which is threaded into said branch and is adapted to bear against the rod 87 to clamp the pivot in any desired position thereupon. When the apparatus is employed for straight cutting, the attachment comprising the parts 86—92 inclusive need not be applied to the end of the shaft 16; or it may be applied thereto and the pivot be swung to the inoperative position indicated in Fig. 3 (the sleeve 86 rotating upon the shaft 16) by suitably adjusting the clamp screw 92. When it is desired to make a curvilinear cut as, for instance, a circular cut, the track will be removed and the pivot will be swung to a vertical position, the point thereof being conveniently inserted in a punch mark made in the plate. The pivot 90 will project downwardly a sufficient distance to lift the wheel 19 clear of the supporting plate. The adjustability of the pivot upon the rod 87 enables cuts of varying curvature to be made.

Having thus described my invention, what I claim is:—

1. In an apparatus of the character described, the combination of a carriage, means for driving the same, a supporting member extending longitudinally with respect to the carriage at one side thereof, a second supporting member rotatably connected to the first mentioned member and swingable about a longitudinal axis, a third supporting member arranged at right angles to the second supporting member, a fourth supporting member rotatably mounted with respect to the third supporting member and swingable about a transverse axis, a gaseous fuel cutting device reciprocably mounted in the last mentioned supporting member, and means for rotating the fourth supporting member.

2. The combination, with a gaseous fuel cutting device, of supporting means therefor, said supporting means including rotary connections arranged in planes at right angles to each other whereby said device may be rotated in such planes, and coöperating means comprising a rack and pinion carried by the supporting means and the cutting device for reciprocating the cutting device with respect to the supporting means.

3. In an apparatus of the character described, the combination of a carriage, means for propelling the same, a cutting torch, a vertically extending support on said carriage through which the torch extends, a rack on said torch, and a pinion on said torch whereby the torch may be reciprocated within said support.

4. In an apparatus of the character described, the combination of a carriage, a motor thereon, a driving connection between said motor and said carriage, a cutting torch, means adjustably supporting said torch from said carriage, a bracket on said carriage, flexible supply tubes for conducting gases to said torch, and clamping means for said pipes associated with said bracket for said pipes.

5. In an apparatus of the character described the combination of a carriage, means for driving said carriage, said carriage having on one side thereof a front wheel and a rear wheel and a gaseous cutting device, a shaft on which the front wheel is mounted, a motor on said carriage for driving said shaft, a second wheel rigidly connected to said shaft on the opposite side of the carriage from the first mentioned front wheel, a pivot-supporting member having a rotary connection with said shaft on the side thereof adjacent the last mentioned wheel, and a pivot adjustably mounted on said member and having one end adapted to engage the surface of the support for the carriage, said pivot being of such length that, when so engaged, it will lift the front wheel adjacent thereto out of contact with such surface.

6. In an apparatus of the character described, the combination of a carriage, flanged front and rear wheels on one side of said carriage, a shaft rigid with the front wheel, a wheel having a substantially flat tread on the opposite end of said shaft from said front wheel and rigid with said shaft, a motor on said carriage, a driving connection between said motor and said shaft, a pivot-supporting member rotatably connected to said shaft and extending from the side thereof having the last mentioned wheel, and a pivot adjustably mounted on said member and adapted to engage the surface on which the carriage is mounted, said pivot being of such length that, when so engaged, it will lift the wheel adjacent thereto out of contact with such surface.

7. In a device of the character described the combination with a carriage, flanged front and rear wheels on one side of said carriage, a shaft rigid with the front wheel, a wheel having a substantially flat tread on

said shaft, said shaft projecting beyond said wheel with a flat tread, driving connections for said shaft, a pivot supporting member detachably connected to said shaft extension, and a pivot adjustably mounted upon said member and adapted to engage the surface on which the carriage is adapted to travel said pivot being of such length that when so engaged it will leave the wheel adjacent thereto out of contact with such surface.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

J. F. RICHARDSON.

Witnesses:
J. R. ROSE,
C. T. SLOAN.