

July 23, 1946.

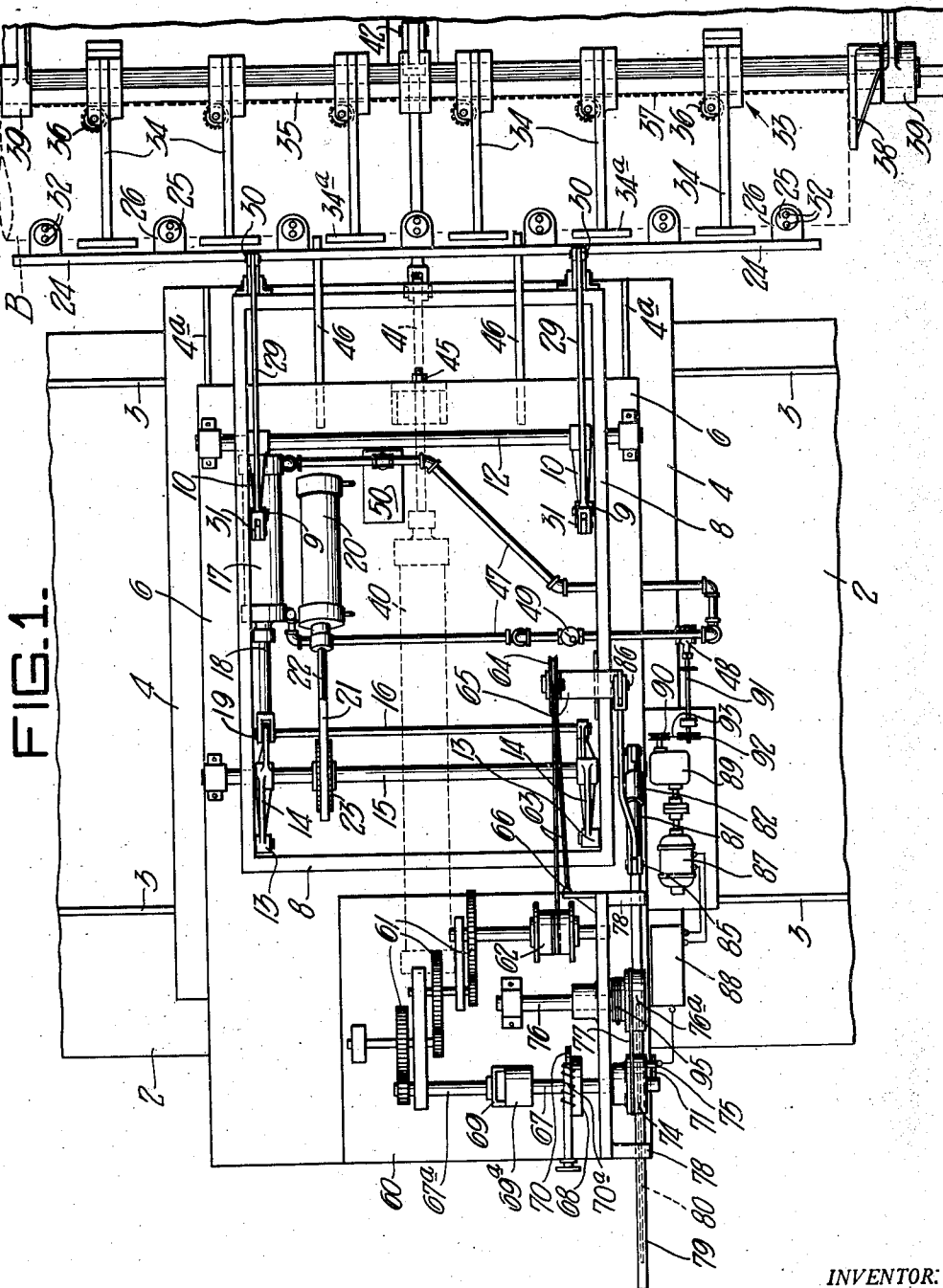
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2,404,600

MACHINE FOR CUTTING BLOOMS AND THE LIKE

Filed Feb. 18, 1943

4 Sheets-Sheet 1



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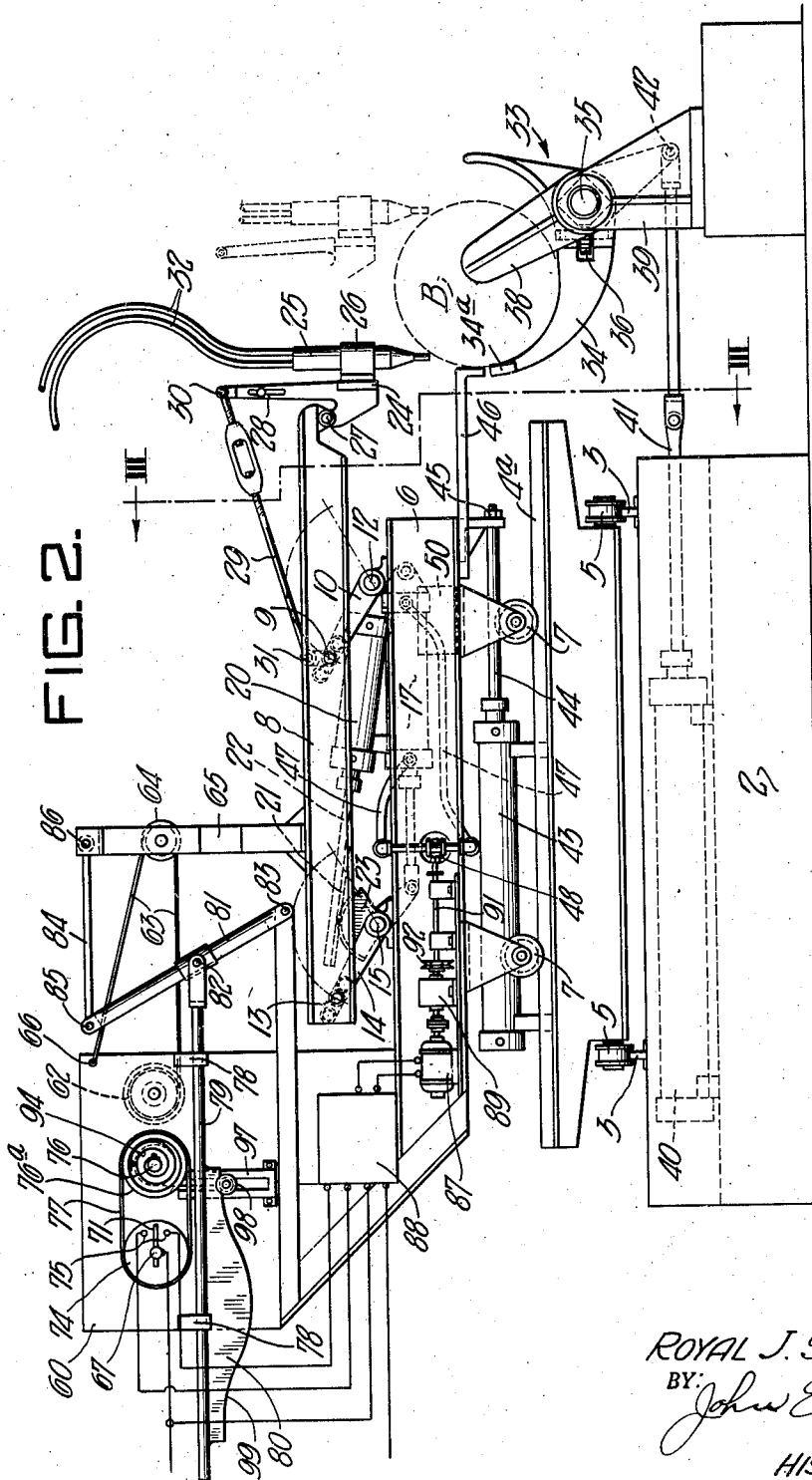
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4 Sheets-Sheet 2.



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4 Sheets-Sheet 3

FIG. 3.

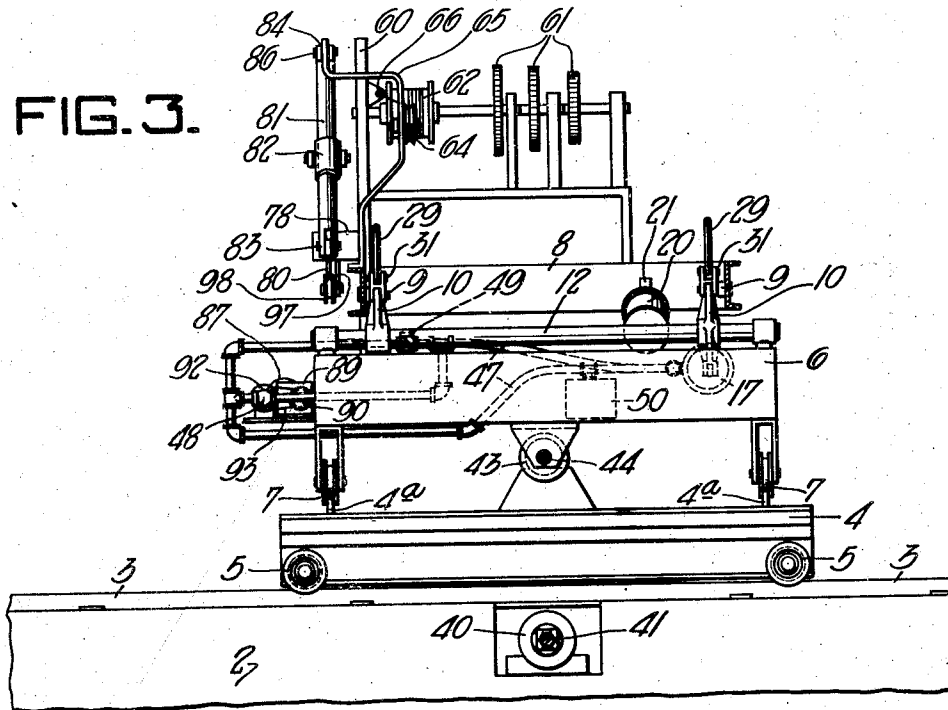
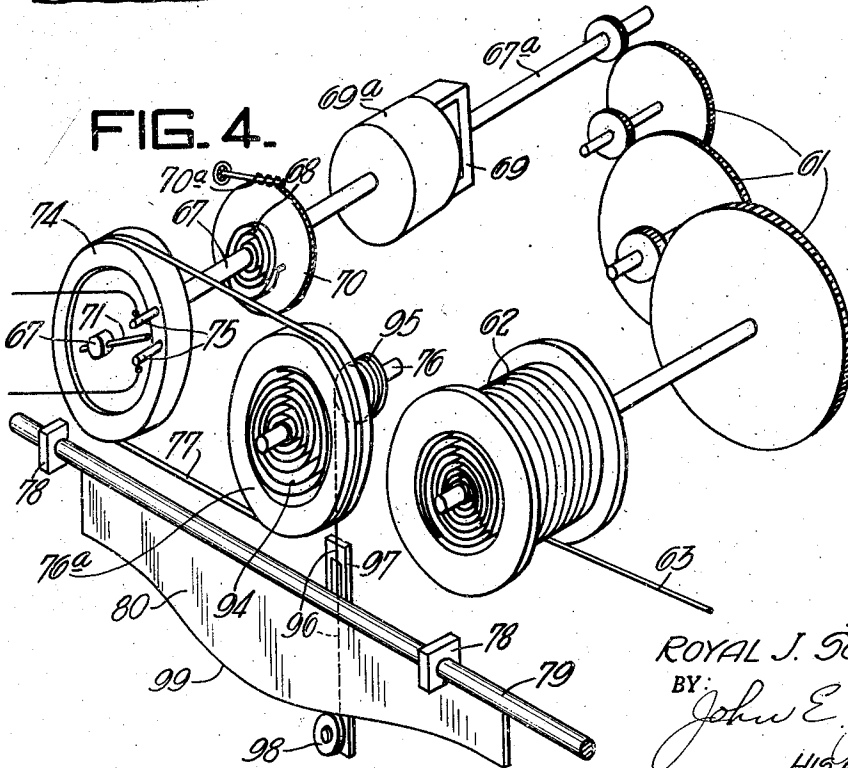


FIG. 4.



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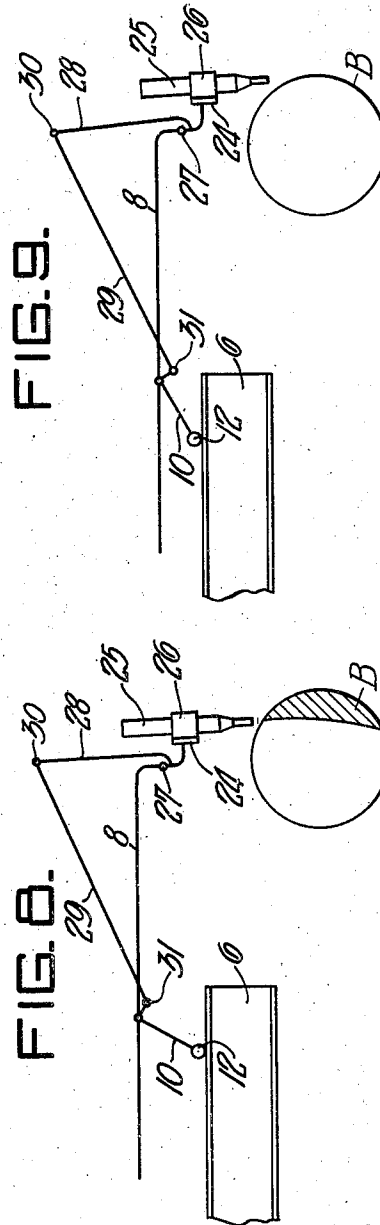
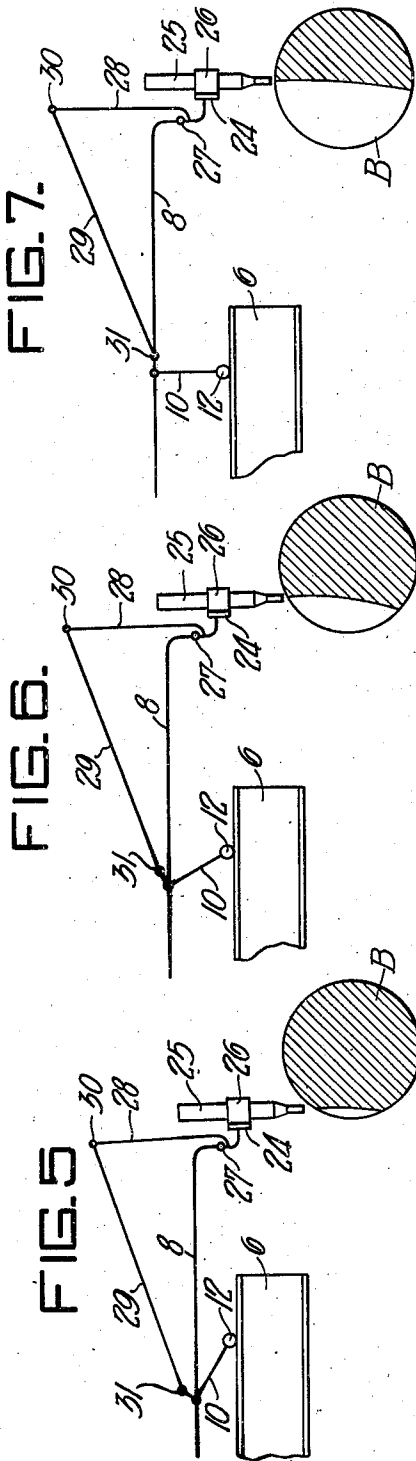
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MACHINE FOR CUTTING BLOOMS AND THE LIKE

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,404,600

MACHINE FOR CUTTING BLOOMS
AND THE LIKE

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Application February 18, 1943, Serial No. 476,346

4 Claims. (Cl. 266—23)

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This invention relates to a machine for and method of cutting metallic articles, and particularly to an improved machine for and method of cutting hot blooms and the like by means of oxy-acetylene cutting torches or blowpipes.

Heretofore, in the steel industry it has been the general practice to form blanks for railroad car wheels, which are later forged into shape by means of a wheel press, from cylindrical blooms about 18 inches in diameter, by means of a metallic beveled edge disk which is forced into and through the hot bloom while the same is rotated so as to cut the same into a plurality of individual car wheel blanks. Such a practice of cutting the blooms is unsatisfactory for the reason that a spiral of metal is formed on the sides of each of the blanks during the cutting thereof from the bloom so that a cambered or conical surface results on each side of each of the blanks. Such cambered surface or spiral formation on the ends of the blanks not only interferes with the forging of the same into car wheels in the wheel press but also interferes with the preheating of the blanks in that when the blanks are forced endwise in abutting relationship through the preheating furnace, the line of blanks due to such cambered end surfaces tend to buckle while being forced through the furnace which, of course, is objectionable.

It has now been proposed to cut hot blooms into car wheel blanks by means of oxy-acetylene cutting torches or blowpipes but if the cutting of a hot bloom, which is usually between 1800 and 2000 degrees F., by such a means, is not performed at the proper speed, the blanks will not be properly cut from each other or a washing away of the metal will result along the bottom of the cut through the bloom, which of course, is objectionable, in that unbalanced car wheel blanks are obtained. It has been found that if the speed of the cutting of the hot bloom by the oxy-acetylene torches or blowpipes can be controlled then an even and straight cut will be obtained and that the blanks would be completely severed from each other and any washing away of the metal at the bottom of the cut would be eliminated and satisfactory blanks would be provided, and it is to such a machine and method in which the speed of cutting of the torches or blowpipes is controlled that the present invention relates.

Accordingly, it is the general object of the present invention to provide an improved apparatus or machine for cutting blooms and the like into blanks by means of oxy-acetylene cutting torches or blowpipes incorporated therewith in which the

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speed of cutting of the torches or blowpipes is controlled throughout the cutting operation.

It is another object of the invention to provide an improved apparatus or machine for cutting blooms and the like into blanks by means of oxy-acetylene torches or blowpipes which is simple and inexpensive in its construction, and, at the same time efficient and effective in its use, and a machine which will cut the workpiece into blanks in a minimum amount of time.

It is still a further object of this invention to provide an improved means for controlling the speed of cutting while cutting hot blooms and the like into blanks by means of oxy-acetylene cutting torches or blowpipes.

It is a more specific object of this invention to provide an improved apparatus or machine for cutting blooms and the like into blanks wherein there is provided a plurality of oxy-acetylene cutting torches or blowpipes which cut simultaneously the bloom or workpiece into a plurality of blanks at a controlled rate of cutting.

It is still another object of the present invention to provide an improved method of cutting hot blooms and the like into a plurality of individual blanks by means of oxy-acetylene torches so as to provide blanks having substantially straight and even cut end surfaces.

Various other objects and advantages of this invention will be more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawings there is shown, for the purpose of illustration, an embodiment which my invention may assume in practice.

In these drawings:

Fig. 1 is a plan view of the improved machine of my invention;

Fig. 2 is a side elevational view thereof;

Fig. 3 is a sectional view taken on line III—III of Fig. 2;

Fig. 4 is an isometric view of the mechanism for controlling the movement and cutting speed of the torches; and

Figs. 5 through 9 are schematic views showing progressively the movement of one of the torches through one cycle of the cutting operation together with the linkage for actuating the same.

Referring more particularly to the drawings, the improved apparatus of my invention comprises a base or frame 2 having disposed thereon a pair of spaced apart rails 3 upon which there is mounted a carriage 4 having wheels 5 which cooperate with the rails to guide the carriage in its movement. On top of the carriage 4, there

is mounted another carriage 6 having wheels 7 which cooperate with rails 4^a carried by the carriage 4 to guide the carriage 6 in its movement in a direction at right angles to that of the movement of carriage 4.

There is mounted on the carriage 6, a rectangular-shaped movable frame-like member 8, sometimes called a grasshopper. Toward the forward end thereof the frame-like member 8 is pivotally attached at either side thereof as at 9, to the outer end of a pair of upwardly extending link members 19, which in turn are securely attached to a transversely extending shaft 12 suitably journaled in the front-end of the carriage 6. The rear-end of the frame-like member 8 is also pivotally attached at either side thereof as at 13 to the outer ends of a pair of similar upwardly extending link members 14 which are securely attached to a transversely extending shaft 15 which is also suitably journaled in the carriage 6 at the rear end of the carriage. The link members 14 extend preferably to a point below the shaft 15 and there is arranged in the lower ends of the link members 14 a transversely extending member 16.

There is positioned on the carriage 6 below the frame-like member 8, preferably a double-acting hydraulic cylinder 17 with the outer end of the piston rod 18 thereof pivotally connected to the transversely extending member 16 as at 19. There is also arranged on the carriage 6 below the frame-like member 8, a double-acting pneumatic cylinder 20 having a gear rack 21 disposed on the outer end of the piston rod 22 thereof. There is mounted on the shaft 15, a gear segment 23, which meshes with the gear rack 21 whereby the frame-like member 8 is moved by the pneumatic cylinder 20 in a manner and for a purpose hereinafter to be described.

There is mounted on a transversely extending member 24 arranged on the front end of the frame-like member 8, a plurality of spaced apart oxy-acetylene cutting torches or blowpipes 25. Each of the torches 25 is mounted on a bracket member 26 whereby each of the brackets together with the torch carried thereby may be adjusted both vertically and longitudinally of the transversely extending member 24. To balance the frame-like member 8 and the weight of the torches 25 together with the transverse member 24, there may be provided a counterweight (not shown).

The transversely extending member 24 is preferably journaled in the front end of the frame-like member 8 as at 27. There is arranged integrally with the transversely extending member 24, preferably a pair of spaced apart upwardly extending arm-like members 28 with the upper end of each of the arm-like members connected to the frame-like member 8, by means of a link member 29. The outer end of each of the link members 29 is pivotally connected with the upper end of the arm-like members 28 as at 30 and the inner end of the link members 29, is pivotally connected to the upwardly extending members 19, to either side of the frame-like member 8 as at 31. It is the purpose of the link member 29 to oscillate the transversely extending member 24 so as to tilt the torches 25 carried thereby relative to the frame-like member 8 upon movement of the same in a manner to be described. Each of the torches 25 is connected to a plurality of oxygen and acetylene supply lines 32 which in turn are connected to a suitable

source of supply of oxygen and acetylene (not shown).

At the front or forward end of the frame-like member 8 directly opposite and below the torches 25, there is positioned a cradle 33 consisting of a plurality of spaced apart arcuate-shaped arms 34 which are mounted on a transversely extending shaft-like member 35. There is arranged with each of the arcuate-shaped members 34, a pinion gear 36 which meshes preferably with a gear rack 37 disposed on the top side of the transversely extending member 35 whereby each of the members 34 may be moved and adjusted along the transversely extending member 35 for a purpose hereinafter to be described. The arcuate-shaped members 34 are adapted to support the bloom or article to be cut and there is mounted on the extreme outer end of each of the arcuate-shaped members, preferably a cross-piece 34^a. There is positioned preferably on the end of the transversely extending member 35 at one side of the cradle, an upwardly extending arm-like stop member 38 against which the end of the bloom or workpiece is adapted to abut so as to properly position the same in the cradle. The outer ends of the transversely extending member 35 are preferably journaled as at 39 in suitable journals arranged in front of the carriages 4 and 6 so that the cradle, i. e., the member 35 together with the arcuate-shaped members 34 carried thereby, may be oscillated. The cradle 33 oscillated preferably by means of a double-acting hydraulic cylinder 40 positioned in back of the cradle adjacent the front end of the carriage 6 and therebelow with the outer end of the piston 41 of the cylinder pivotally connected to the cradle 33 as at 42.

There is mounted on the carriage 4 below the carriage 6, a double-acting hydraulic cylinder 43, with the outer end of the piston 44 thereof connected to the front end of the carriage 6 as at 45 for moving the same together with the frame-like member 8 and the torches 25 carried thereby toward and away from the cradle 33 and the bloom or workpiece B to be cut positioned therein. At the forward or front end of the carriage 6 there is positioned preferably a pair of spaced apart outwardly extending arm-like members 46 which are adapted to abut against the workpiece when the carriage is moved forwardly to position to cut the bloom or article so that the torches 25 are positioned at the proper distance from the workpiece at the start of the cut. It will be understood that it is the purpose of the frame-like member 8 to move the torches 25 carried thereby in substantially an arcuate path so that the tips of the nozzles of the torches will be spaced substantially the same distance from the outer surface of the workpiece or the bloom during the entire time of the cutting thereof. In other words, the frame-like member 8 has an action similar to that of a pantograph and the torches 25 carried thereby are made to travel in an arcuate path partially around the periphery on the top side thereof so that the nozzles of the torches are spaced at all times at any point in their travel at the proper cutting range of distance from the workpiece.

While the frame-like member 8 is moved and made to oscillate so that the torches 25 travel in an arcuate path by means of the pneumatic cylinder 20 through the action of the gear rack 21 and the gear segment 23, carried by the shaft 15, the speed of the movement of the frame-like member 8 is controlled by the hydraulic cylinder 17 in a manner which will now be described.

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There is provided, an oil or fluid supply line 47 which interconnects the opposite ends of the cylinder 17, and there is arranged in this oil or fluid supply line, a control valve 48 and a check valve 49. There is also arranged in fluid supply line 47, an oil supply tank or reservoir 50 for maintaining a supply of oil continuously in the fluid supply line in a well known manner.

The fluid pressure in the cylinder 17 is controlled by the movement of the frame-like member 8 through a linkage arrangement and speed control mechanism and a timing mechanism which will now be described. The speed control mechanism for regulating the flow of oil in the cylinder 17, as clearly shown in Figs. 1 and 4 of the drawings, is preferably located at the rear end of the apparatus and to one side thereof and consists preferably of a housing or supporting member 60 in which there is positioned a gear train 61. There is carried by the supporting member or housing 60, a drum 62 which is arranged with one of the gears of the gear train. Around the periphery of the drum 62, there is disposed a cable 63 which passes over and around a pulley or idler sheave 64 which is mounted preferably on an upwardly extending arm-like member 65 carried by the frame-like member 8. The inner end of the cable 63 is attached to the periphery of the drum 62 and the outer free end of the cable is attached preferably to the housing 60 as at 66. On a shaft 67^a rotatably carried by the housing 60 having a gear of the gear train 61 disposed thereon, there is arranged an integrator consisting preferably of a magnet 69 which is disposed preferably in a receptacle 69A which, in turn, is arranged on the outer end of a shaft 67 journaled in the housing 60. The device functions somewhat similar to a fluid device except that the medium through which the forces are transmitted is magnetic flux instead of a fluid. There is also arranged on the shaft 67, a spiral spring 68 having the inner end thereof connected to the periphery of the shaft 67 with the outer end thereof connected to an annular gear member 70 rotatably mounted thereon which is in mesh with a worm 70^a suitably mounted on the housing 60 to hold the disc 70 in the desired position. There is also mounted on the shaft 67, a contact finger or pointer 71. There is mounted for rotative movement preferably on the outer side of the housing 60, an annular member 74 having a pair of spaced apart contact fingers 75 between which the end of the pointer or hand 71 is floatingly positioned and with which it is adapted to cooperate in a manner hereinafter to be described. There is rotatably mounted on a shaft 76 carried by the housing 60 at a point preferably on the outer side of the housing adjacent and to one side of the annular member 74, a disk-like member 76^a around the periphery of which there is disposed a cable 77 which also passes over and around the annular member 74 whereby the disk upon rotative movement thereof rotates the annular member 74. There is arranged with the disk 76^a, preferably a spiral spring 94, one end of which is attached to the disk 76^a and the other end to the shaft 76, which tends to rotate the disk in one direction on the shaft 76 for a purpose to be described.

There is arranged on the outer side of the housing 60 preferably at a point directly below the disk member 76^a and the annular member 74 in suitable spaced apart bearings 78 carried by the housing 60, a reciprocating rod 79 having

a downwardly extending cam member 80 carried thereby. The inner end of the reciprocating rod 79 is pivotally connected to a link member 81 as at 82 intermediate the length thereof. The lower end of the link member 81 is pivotally connected preferably to the carriage 6 as at 83 and the upper end of the link member 81 is pivotally connected to the outer end of a link member 84 as at 85. The inner end of link member 84 is pivotally connected to the upwardly extending arm 65 as at 86 carried by the frame 8 whereby the rod 79 together with the cam 80 will be moved reciprocally upon the movement of the frame-like member 8 through the action of linkage 81 and 84. There is also mounted on the shaft 76 and attached to rotatable disk 76^a for rotation therewith, a drum 95 over and around which is disposed a cable 96 having the inner end thereof connected to the periphery of the drum with the outer end of the cable attached to a roller or cam follower 98 which is adapted to cooperate with the cam surface 99 of the cam 80. Cam follower 98 is reciprocally mounted in a vertically positioned slideway 97 attached to the side of housing 60. Thus it is seen that downward movement of the cam follower 98 during the first half of the cutting stroke winds the spring 94 to increase the tension therein and thereby maintains follower 98 in contact with cam surface 99 during the last half of the cutting stroke of the torch.

It will be understood that it is the purpose of the contact members 75 together with the contact finger or pointer 71 which cooperates therewith to control the action of the valve 48. In order for the contacts and the pointer to control this valve, there is provided a reversing motor 87 which is connected preferably to a suitable relay panel 88 to which the contacts and the pointer are also connected. The motor 87 is connected preferably to a gear reducer 89 having a pulley 90 arranged therewith. Adjacent the motor 87 and the gear reducer 89, there is suitably mounted a shaft 91 having one end thereof connected to the valve 48 for opening and closing the same. There is mounted on the shaft 91, a pulley 92 directly opposite and in line with the pulley 90 of the gear reducer 89 and there is disposed around the pulleys 90 and 92, a belt 93 whereby the shaft 91 is rotated upon rotative movement of the pulley 90 of the gear reducer 89 through the action of the motor 87.

The improved apparatus of my invention functions in the following manner: The blowpipes or torches 25 are first adjusted along the transversely extending member 24 so that the torches 25 are spaced the proper distance apart in order to cut the workpiece or bloom into pieces of desired number and size. The arcuate-shaped members 34 of the cradle 33 are then properly positioned along the shaft-like member 35 so that they are disposed between the torches 25 whereby the flame issuing forth therefrom will not contact the arcuate-shaped members. For ease in setting up the machine, the arcuate members 34 may be set up properly with respect to one another and then the truck or carriage 4, may be moved by means of a hydraulic cylinder (not shown) so that the torches are disposed between the arcuate-shaped members 34. It will be understood that it is the purpose of the arcuate-shaped members 34 to support the bloom while it is being cut and likewise to support the individual pieces into which the workpiece or bloom is cut after the cutting operation.

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The stop member 38 is then set so that the desired crop will be cut from that end of the workpiece. The workpiece or bloom B, is then positioned on the cradle 33 so as to rest in a horizontal position upon the arcuate-shaped members 34 with one end of the workpiece or bloom positioned against the stop member 38 arranged at one end of the cradle. When the bloom or workpiece is positioned on the cradle 33, the cradle is disposed in its most forward position, and after the workpiece is positioned thereon, the cradle is oscillated or tilted rearwardly toward the torches 25 by means of the hydraulic cylinder 40 which rotates the transversely extending member 35 together with the arcuate-shaped members 34 mounted thereon. The carriage 6 together with the frame-like member 8 and torches 25 carried thereby, is then moved forwardly by means of the hydraulic cylinder 43 until the outer free ends of the arm-like members 46 strike the inner side of the bloom or workpiece. This positions the torches 25 initially relative to the workpiece or bloom for the start of the cutting operation.

The frame-like member 8 together with the torches 25 carried thereby, is then set into operation and it will be understood that due to the construction and the movement of the frame-like member 8, the tips of torches 25 carried thereby, will move in an arcuate path substantially circumferentially around the top side of the workpiece or bloom when links 10 and 14 are of length equal to the radius of the bloom. By providing such an arrangement, it will be seen that the tips of the blowpipes or torches are positioned within the required range of distance for satisfactory cutting from the outer surface of the bloom or workpiece throughout the travel of the frame-like member 8 and during the entire cutting period. The frame-like member 8 is actuated by means of the pneumatic cylinder 20 through the action of the gear rack 21 and the gear segment 23. It will be understood that the torches 25 are supplied with a suitable source of oxygen and acetylene through the lines 32 and are lighted immediately before the frame-like member is set in motion for cutting.

It is important that the cutting operation be performed at a predetermined velocity and this is one of the most important aspects of the present invention. In other words, there is provided a predetermined cutting speed curve, i. e., speed versus position of the blowpipes 25 relative to the varying cutting thickness of the bloom or workpiece. To obtain such cutting action, the movement of the frame-like member 8 together with the torches 25 carried thereby, is controlled by the hydraulic cylinder 17 which counter-acts the movement of the frame-like member by the cylinder 20. It will be understood that oil is maintained in the cylinder 17 at all times by the means of lines 47, and that upon movement of the frame-like member 8, the oil is forced from the head end of the cylinder 17 by the action of the piston 18 thereof upon movement of the frame-like member 8 to which it is attached, through the line 47 and back through the control valve 48 and into the opposite end of the cylinder 17. Any differential in the volume of the oil in the line 47 and cylinder 17 is compensated for by means of the supply tank or reservoir 50. When the control valve 48 is partially closed, it will be seen that the oil in the head end of the cylinder 17 will not pass therefrom through the lines 47 as fast as it would if the valve were fully opened.

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In other words, the frame-like member 8 will move slower when the control valve 48 approaches its closed position for the reason that back pressure is built up in the head end of the cylinder 17 thereby tending to prevent outward movement of the piston 18 which in turn prevents or slows down the movement of the frame-like member 8 together with the torches 25 carried thereby. As has been hereinbefore explained, the opening and closing of the valve 48 is controlled by means of the motor 87, through the action of the gear reducer 89, belt 90 and the shaft 91 which is connected directly to the valve. It is the purpose of the check valve 49 to permit a free flow of the oil through the line 47 from one end of the cylinder to the opposite end thereof, when the frame-like member 8 is returned quickly to its normal or starting position after the cutting operation.

The energization of the motor 87 is controlled by the contacts 75 and the finger 71 which are connected to a suitable source of electrical power through the relay panel 88. When the frame-like member 8 is moved, the cable 63 which is connected thereto by means of the sheave 64 rotates the drum 62 and through the action of the gear train 61 rotates the shaft 67^a, together with the magnet 69 carried thereby. In other words linear input produced by the motion of the frame-like member 8 is reduced to a rotary motion by means of the cable 63 and its associated parts. The magnet 68 in turn tends to rotate the receptacle 69^a on the end of shaft 67 but the rotation of the receptacle is opposed by the reaction of the spiral spring 68. The torque produced in the receptacle 69^a is directly proportional to the speed of rotation of the magnet 69 as this torque tends to rotate the shaft 67 and the contact finger or pointer 71 carried thereby limits this rotation to the movement of the end of the pointer or contact finger between the contacts 75. For a given speed, if the torque produced by the magnet 69 is sufficient to overcome the counteracting torque produced by the spring 68, the pointer will rest against one contact. If the torque produced by the magnet is not sufficient to overcome the torque produced by the spring 68, the pointer will rest against the other contact.

It will also be seen that as the frame-like member 8 moves, it in turn moves the rod 79 together with the cam 80 carried thereby in a horizontal plane through the action of the linkage 81 and 84. As the cam 80 is moved, the cam surface 99 thereof moves the roller or follower 98 in a vertical plane and the disk-like member 76^a is rotated by the vertical pull exerted on the cable 96. As the disk 76^a rotates, it in turn rotates the annular member 74 upon which the contacts 75 are positioned. It will be understood that it is the purpose of the spiral spring 94 to maintain the cam follower 98 against the cam surface 99 of the cam 80 at all times.

The control valve 48 normally assumes a partially closed position and if the speed of the frame-like member or pantograph 8 is too slow, the pointer 71 through the action of the magnet 69, the shaft 67^a, the gear train 61 and the cable 63 will be moved into engagement with one of the contacts 75 of the annular members 74 so as to complete the circuit through the relay panel 88 whereby the motor 87 is energized and the control valve 48 is moved to a more fully open position. When the valve 48 is moved toward its open position, it will be seen that the oil pressure in the head end of the cylinder 17 decreases and permits the piston 18 thereof, together with the

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frame-like member 8 and the torches 25 carried thereby to move at a greater speed. This increases the speed of the frame-like member 8 and through the action of the cable 63, the shaft 67, the pointer 71 and associated parts is moved out of contact with that contact member 75 and moved toward and into contact with the opposite contact member 75. At this point, another circuit is closed through the relay panel 88 and the motor 87 is again energized to rotate the motor in the opposite direction so as to move the valve toward its closed position. This decreases the speed of the frame-like member 8 and the pointer 71 moves out of contact with the contact member, whereby the motor is de-energized. It will be understood that the contact finger 71 normally floats between the contact fingers 75 and it is only when the movement of the frame-like member 8 is too fast or too slow that the contact finger comes in contact with the contact 75 to either slow down the movement of the frame-like member together with the torches 25 carried thereby or to speed up the same as the case may be. It will be understood that the cam 80 is designed so that the proper cutting speed of torches or blowpipes 25 is obtained for the particular round or piece of metal adapted to be cut. In the present case, there is shown a cam, for controlling the movement of the cutting torches or blowpipes for cutting a hot bloom 18" in diameter as rolled between about 1800 to 2000 degrees F. into a plurality of individual pieces so as to form car wheel blanks. After the bloom or workpiece has been cut into a number of individual pieces, it will be seen that each of them is supported by one of the arcuate-shaped members 34 and that during the cutting operation, the flame from the torches 25 passes between the same. At the end of the cutting operation, the frame-like member together with the torches carried thereby is made to travel in a reverse direction, so as to move the torches 25 back to their initial or retracted position away from the workpiece or bloom and in position for the next cutting operation. It will be understood that the frame-like member 8 is moved in such reverse direction by means of the pneumatic cylinder 20 through the action of the rack 21 and the gear segment 23. After the frame-like member 8 together with the torches 25 carried thereby is moved to a retracted position away from the bloom or workpiece, the cradle 33, is tilted or oscillated by means of the hydraulic cylinder 40 so that the individual pieces into which the bloom has been cut, roll over the outer or forward end of the arcuate-shaped members 34 and are removed from the cradle. There is positioned in front of the cradle 33, preferably any suitable receptacle for receiving the cut pieces as they roll or drop from the cradle. The machine or apparatus is now in position for receiving the next bloom or workpiece to be cut. If desired, an air or gas jet (not shown) may be incorporated with each of the arcuate-shaped members 34 for the purpose of blowing the slag clear from between the blanks at the cuts through the workpiece.

It will be understood that the length of each of the members 10 and 14 is adjustable as shown in Figure 2 so that the forward end of the frame-like member 8 can be adjusted vertically for cutting various size rounds. It is the purpose of the linkage 28 and 29, as more fully shown in Figs. 5 through 9 of the drawings, to tilt the transversely extending member 24 together with the torches or blowpipes 25 carried thereby, so that

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the cutting flame of the torches will be disposed angularly relative to the axis of the workpiece or bloom at the start of the cutting operation and at the end thereof. It is desirable to have the linkage 28 and 29, each in itself adjustable as to length so that the angularity of the torches relative to the bloom may be varied as desired especially as the torches approach and move away from the bloom or workpiece. Such an arrangement prevents washing away of the metal at the bottom of the cut thereby providing clean square cut through the workpiece. It will be understood that the function of the cam 80 in bearing and controlling the cutting speed within close limits makes it possible to cut hot steel where the total cutting time is approximately one-third of that required to cut a similar piece of cold metal or steel. This reduction in time reduces by practically the same ratio, allowable variations in speed for good cutting and therefore, requires much more accurate control. Also, the size and shape of the cam 80 may be changed and varied to satisfy the workpiece being cut. The arcuate movement and variable speed of the torches or blowpipes required for straight and clean cutting of hot blooms or workpieces (1800 to 2000 degrees F.) wherein the thickness of the metal being cut is variable is hereby accomplished.

As a result of my invention, it will be seen that I have provided apparatus for efficiently and effectively cutting blooms into a plurality of individual pieces so as to provide blanks which have perfectly straight and clean cut surfaces so as not to interfere with any future working of the blanks. While my machine is designed primarily for cutting cylindrical pieces, it will be understood that it may be used if desired for cutting a workpiece having a square, hexagonal, elliptical or other cross section.

While I have shown and described one specific embodiment of my invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. A machine for cutting articles of the class described comprising, torch cutting means, reciprocable means for holding said torch cutting means, means for moving said reciprocable means to move the torch cutting means transversely of and at a spaced distance from the workpiece to be cut, means for controlling the movement of said reciprocable means, means responsive to the speed of movement of said reciprocable means for controlling said reciprocable means controlling means, and means responsive to the position of said reciprocable means for varying the response of said speed responsive means.

2. A machine for cutting articles of the class described comprising, torch cutting means, reciprocable means for holding said torch cutting means, means for moving said reciprocable means to move said torch cutting means transversely of and at a spaced distance from the workpiece to be cut, hydraulic means for controlling the movement of said reciprocable means, means responsive to the speed of movement of said reciprocable means for controlling said hydraulic means, and means responsive to the position of said reciprocable means for varying the response of said speed responsive means.

3. A machine for cutting articles of the class described comprising, torch cutting means, re-

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reciprocable means for holding said torch cutting means, means for moving said reciprocable means to move said torch cutting means transversely of and at a spaced distance from the workpiece to be cut, hydraulic means for controlling the movement of said reciprocable means, means responsive to the speed of movement of said reciprocable means for controlling said hydraulic means, and cam means responsive to the position of the reciprocable means for varying the response of said speed responsive means.

4. A machine for cutting articles of the class described comprising, torch cutting means, a frame-like member carrying said torch cutting means, means for reciprocally moving said frame-like member to carry the torch cutting means in an arcuate path at a spaced distance from the workpiece to be cut, a hydraulic cylinder which counteracts the movement of the frame-like member by said last mentioned means, a valve for controlling the flow of the fluid from the hydraulic cylinder whereby the pressure therein is controlled, electrical means for actuating said valve so as to open and close the same, an electrical circuit connected to said electrical means for energizing the same to move the valve toward its open or closed position, a pair of opposed contact members arranged in said circuit,

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and contacting means arranged in said circuit which is responsive to the speed of movement of the frame-like member and which is adapted to cooperate with said contact members to close the circuit whereby the speed of the frame-like member together with the cutting torches carried thereby is adapted to be controlled, said contacting means adapted to contact one of said contact members so as to close the circuit there-through whereby the electrical means is adapted to move said valve toward its open position so as to permit an increased rate of flow of the fluid from the hydraulic cylinder so that the frame-like member travels at a greater rate of speed, and said contacting member adapted to contact the other of said contacting members so as to close the circuit therethrough whereby the electrical means is adapted to move said valve toward its closed position so as to decrease the rate of flow of the fluid from the hydraulic cylinder so that the frame-like member travels at a slower rate of speed, and cam means responsive to the position of said frame-like member for varying the responsiveness of the contacting means whereby the cutting speed of the torches is controlled and a predetermined cutting speed is obtained.

ROYAL J. SCOVILL, JR.