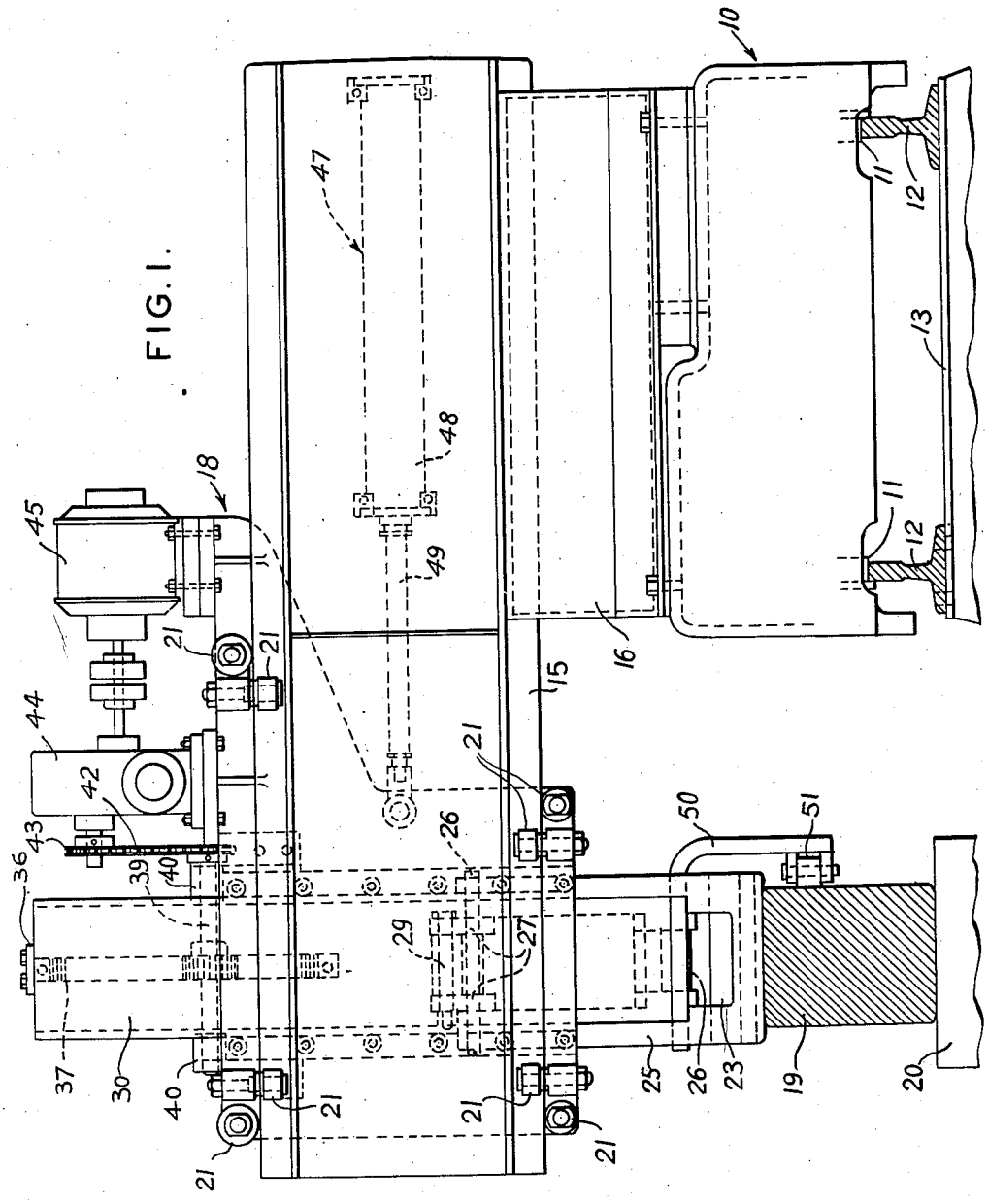
July 31, 1945. J. L. ANDERSON 2,380,569

BILLET SURFACING MACHINE

Filed April 22, 1942 3 Sheets-Sheet 1

FIG. 1.



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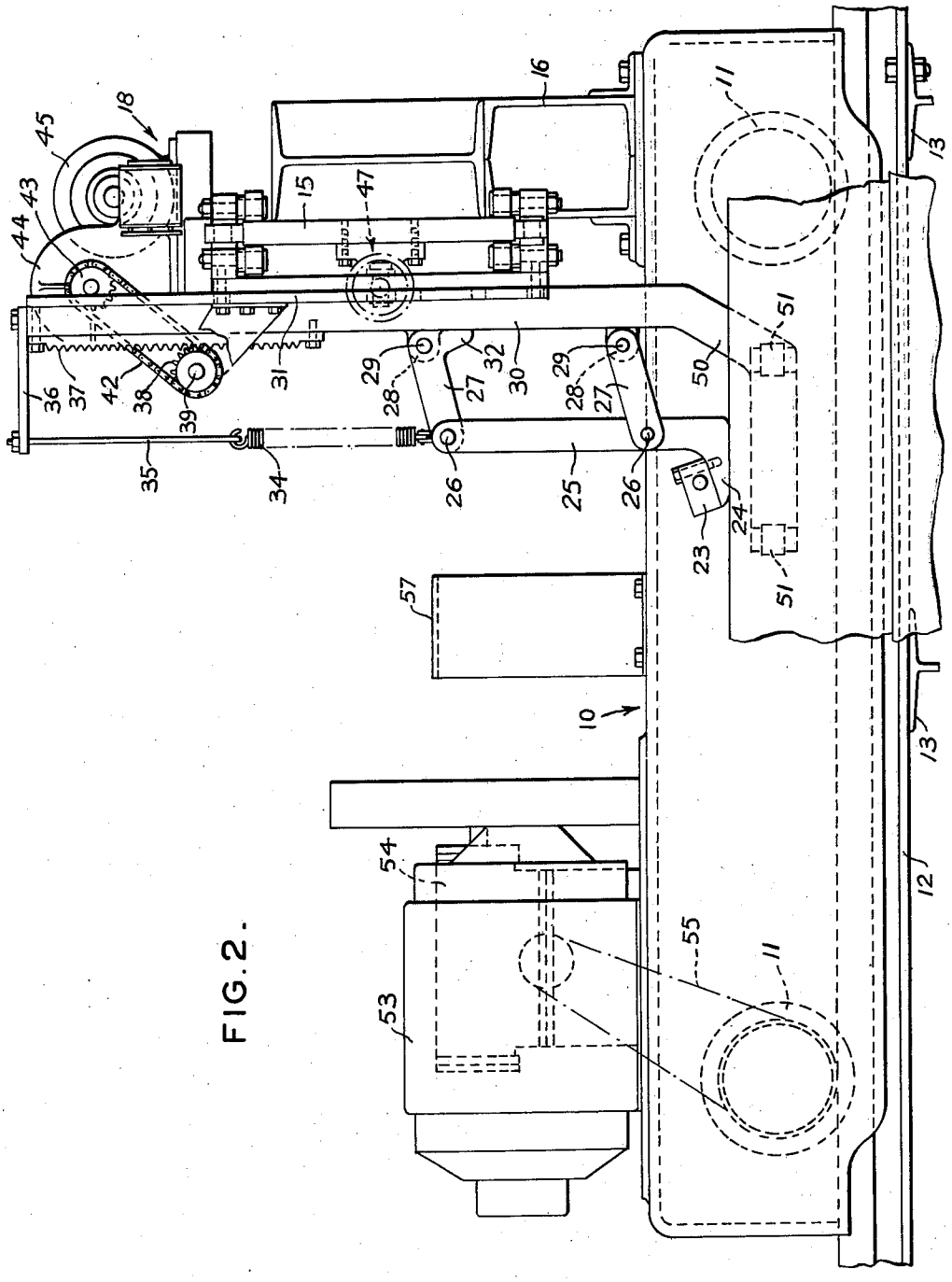


FIG. 2.

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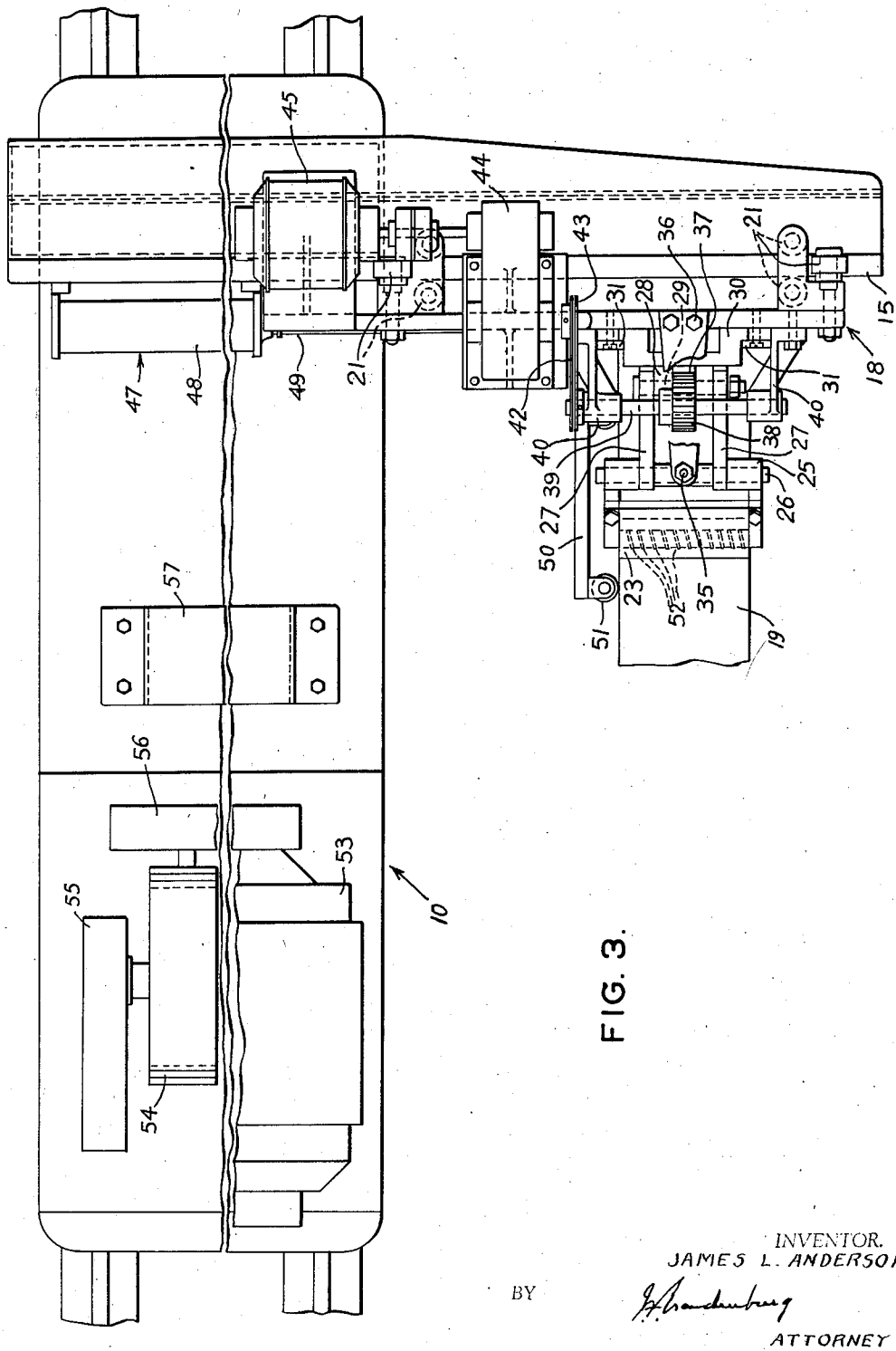


FIG. 3.

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BILLET SURFACING MACHINE

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Application April 22, 1942, Serial No. 440,050

4 Claims. (Cl. 266—23)

This invention relates to machines for removing the metal from the surface of billets or other ferrous metal work-pieces.

Such operations are employed for eliminating surface imperfections preparatory to subsequent rolling operations. By using a plurality of torching oxygen streams the metal across the entire width of a billet can be removed in a single pass, and with some apparatus the metal is removed from all sides of the billet simultaneously.

It is an object of this invention to provide improved apparatus for removing the metal across one surface of a billet, but some features of the invention are not limited to apparatus that surfaces only one side of the billet at a time.

Since billets are often warped or crooked, it is important for a scarfing torch to shift both vertically and horizontally in following the contour of a billet surface. Undulations of the surface can be taken care of by having the torches bear on the surface of the work and supporting them so that they are free to move up and down with variations in that surface. For transverse displacement of the torches, to follow a crooked billet, a contact member bearing against a side of the billet and connected to the torch-holders can be used. The contact member must be yieldingly held against the side of the billet.

It is another object of the invention to provide improved apparatus for causing a scarfing torch or torches to follow a warped or crooked billet. In the preferred embodiment of the invention the torch is supported for up and down movement from a frame that has straight-line horizontal movement transverse of the direction of relative movement of the billet and surfacing machine. A guide or contact member is secured to the torch-supporting structure in position to bear against a side of the billet and a resilient pressure device, such as a cylinder-and-piston motor operated with compressed air, for holding the contact member against the side of the billet.

Other objects, features, and advantages of the invention will appear or be pointed out as the specification proceeds.

In the accompanying drawings, forming part hereof:

Fig. 1 is an end view of a billet scarfing machine embodying this invention.

Fig. 2 is a side elevation of the machine shown in Fig. 1.

Fig. 3 is a top plan view, partly broken away, of the scarfing machine shown in the other views.

The machine includes a base or carriage 10 with four wheels 11 that run on a track comprising rails 12 fastened to ties 13. A cantilever arm 15 is rigidly connected with a support 16 that extends upward from the base 10.

A frame 18 is movable along the arm 15 transversely of the rails 12 and transversely of a billet 19 that rests on a support 20 and extends parallel to the rails. The frame 18 has anti-friction rollers 21 that contact with guide surfaces on the top, bottom, and both sides of the arm 15. These rollers 21 are probably best shown in Fig. 2.

A torch 23 has a shoe 24 that rests on the top surface of the billet during a scarfing operation. The shoe 24 is connected to the lower end of a torch support 25. Shafts 26 extending across the torch support 25 pivotally connect the torch support with the forward ends of links 27 and make the torch support the front member of a folding parallelogram linkage. The rearward ends of the links 27 are connected with lugs 28 by pins 29, and the lugs 28 are integral parts of a slide 30 that moves up and down in a guide 31 on the transversely movable frame 18. The upper link 27 has a tail portion 32 that contacts with the front of the slide 30 to limit the downward movement of the link 27 and the other parts of the folding parallelogram and the parts connected to it.

A part of the weight of the torch 23, shoe 24, torch support 25 and links 27 is counterbalanced by a spring 34 connected at its lower end to the shaft 26 and at its upper end to an eye bolt 35 that extends downward from a bracket 36 which projects forward from the top of the slide 30.

A rack 37 secured to the front of the slide 30 meshes with a pinion 38 fixed to a shaft 39 that turns in bearings in supports 40 extending from the frame 18 on either side of the slide 30. A sprocket on the end of the shaft 39 is rotated by a chain 42 which passes over a driving sprocket 43 at the low speed end of a reduction gearing 44. The reduction gearing 44 is rotated by an electric motor 45. All of the driving means for the shaft 39 are supported on the transversely movable frame 18. The motor 45 is reversible and is operated one way or the other to raise or lower the slide 30 for moving the torch shoe 24 out of or into contact with a billet.

The transversely movable frame 18 is shifted along the arm 15 by a double-acting motor 47, best shown in Fig. 1. This motor includes a cylinder 48 secured to the transversely extending arm 15, and a piston rod 49 connected to the movable frame 18. The motor 47 is preferably operated by compressed air or other gas pressure.

A guide 50 is secured to the lower end of the

slide 30 and has rollers 51 for contact with a side face of the billet 19. The guide 50 and its rollers 51 are in such relation to the torch 23 that the torch is in the correct position for scarfing the top face of the billet 19 when the rollers 51 are against the side of the billet. The jet passages from which the torch projects streams of scarfing oxygen against the billet are indicated by the reference character 52 in Fig. 3. The torch 23 also has orifices for preheating flames, in accordance with usual practice. The jet passages 52 are directed toward one side of the billet in Fig. 3 but torch means that direct the oxygen streams straight ahead can be used.

The base or carriage 10 is moved along the rails 12 by an electric motor 53 that drives the front wheels 11 through reduction gearing 54 and sprocket chains 55 and 56. There is a seat 57 for the operator who rides on the carriage 10. Gas and electric control apparatus are not shown in the drawings since they would complicate the views, and the control apparatus necessary will be evident to those skilled in the art.

The operation of the machine is as follows:

The motor 53 is operated to drive the base or carriage 10 to a position along the rails 12 that locates the torch close to the end of a billet. With the carriage 10 stopped in such position, and the torch at a level high enough to clear the top of the billet, the cylinder-and-piston motor 47 is operated to move the frame 18 along the arm 15 until the rollers 51 of the guide 50 come into contact with the side of the billet 19.

The torch 23 is lighted, and the motor 45 is operated to lower the slide 30 until the torch means is in working relation with the billet. In the illustrated embodiment of the invention, this means that the slide 30 is lowered until the shoe 24 comes into contact with the surface of the billet. The slide is lowered a little below this position so that the torch will be free to move down as well as up as the shoe 24 travels over an undulatory billet surface. The torch is allowed to remain stationary until the surface of the billet has been heated to a kindling temperature. The scarfing oxygen is then turned on and the motor 53 started to move the torch along the length of the billet for progressively removing the metal along the top surface of the billet.

Since billets are often crooked, it is necessary to have some means for causing the torch 23 to follow variations, both vertical and horizontal, in the billet surface. The torch has a floating action in following vertical variations in the billet surface since any rise in the level of the billet moves the torch upward by pressure against the shoe 24, and the weight of the parts causes the torch 23 to move downward with any lowering of the billet surface; the shoe 24 always remaining in contact with the billet.

The air pressure in the motor 47 is maintained during the scarfing operation so that the motor 47 by yieldingly holding the rollers 51 against the side of the billet cause the torch 23 to shift either way necessary to follow transverse crookedness in the billet 19.

At the end of the billet, the gas to the torch is shut off, the motor 45 operated to raise the slide 30 and the cylinder and piston motor 47 operated to withdraw the guide 50 from the side of the billet. The machine is then ready to move into position to start work on another billet.

The preferred embodiment of the invention has been described, but changes and modifications can be made, and some features of the invention can be used without others. Terms of orientation are for the most part relative.

I claim:

1. In a billet surfacing machine including a base, a horizontal cantilever bearing arm rigidly mounted on the base and projecting laterally therefrom, torch-supporting elements supported from said bearing arm including a frame mounted to travel rectilinearly along said bearing arm, a vertical guide on said frame and a supporting slide mounted to move vertically and rectilinearly along said guide on the frame and movable transversely as a unit with the frame, torch means mounted on the slide adapted to project jets of oxidizing gas against the top surface of the billet on which the machine is operating and a contact member connected to one of said elements and located in position to contact with a vertical side face of the billet for controlling the transverse adjustment of the frame on the arm; the improvement which comprises means acting on one of said elements for yieldingly urging said frame to move transversely along the bearing arm in the direction that holds the contact member against the side of the billet.

2. In a billet surfacing machine including a carriage movable along a course parallel to and at one side of the billet to be operated upon, a horizontal cantilever bearing arm rigidly mounted on the carriage and projecting therefrom transversely of the direction of the movement of the carriage, a frame mounted to travel rectilinearly along said bearing arm, a vertical guide on said frame, a torch supporting slide mounted to move vertically and rectilinearly along said guide on the frame and movable transversely as a unit with the frame, torch means mounted on the slide adapted to project jets of oxidizing gas against the top surface of the billet and a contact member connected with said slide and located in position to contact with a vertical side face of the billet; the improvement which comprises means yieldingly urging said frame to move transversely along said bearing arm in the direction that holds the contact member against the side of the billet.

3. In a billet surfacing machine including a base, a horizontal cantilever bearing arm rigidly mounted on the base and projecting laterally therefrom, torch-supporting elements supported from said bearing arm including a frame mounted to travel rectilinearly along said bearing arm, a vertical guide on said frame and a supporting slide mounted to move vertically and rectilinearly along said guide on the frame and movable transversely as a unit with the frame, torch means mounted on the slide adapted to project jets of oxidizing gas against the top surface of the billet on which the machine is operating and a contact member connected to one of said elements and located in position to contact with a vertical side face of the billet for controlling the transverse adjustment of the frame on the arm; the improvement which comprises fluid-actuated extensible means having opposite ends connected, respectively, to the frame and the horizontal cantilever bearing arm for yieldingly urging said frame to move transversely along said bearing arm in the direction that holds the contact member against the side of the billet.

4. In a billet surfacing machine including a carriage movable along a course parallel to and at one side of the billet to be operated upon, a horizontal cantilever bearing arm rigidly mounted on the carriage and projecting therefrom trans-

versely of the direction of the movement of the carriage, a frame mounted to travel rectilinearly along said bearing arm, a vertical guide on said frame, a torch supporting slide mounted to move vertically and rectilinearly along said guide on the frame and movable transversely as a unit with the frame, torch means mounted on the slide adapted to project jets of oxidizing gas against the top surface of the billet and a contact member connected with said slide and located in position to contact with a vertical side face of the billet; the improvement which comprises a fluid cylinder mounted on the horizontal cantilever bearing arm, and a piston in said cylinder having the outer end of its piston rod connected to the frame, whereby when fluid is introduced into the cylinder behind the piston the frame will yieldingly be urged to move transversely along said bearing arm in the direction to cause the contact member to bear against the side of the billet.

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