Nov. 12, 1940. F. F. HILLIX 2,221,349

TRAVERSING MECHANISM

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FIG. 1.

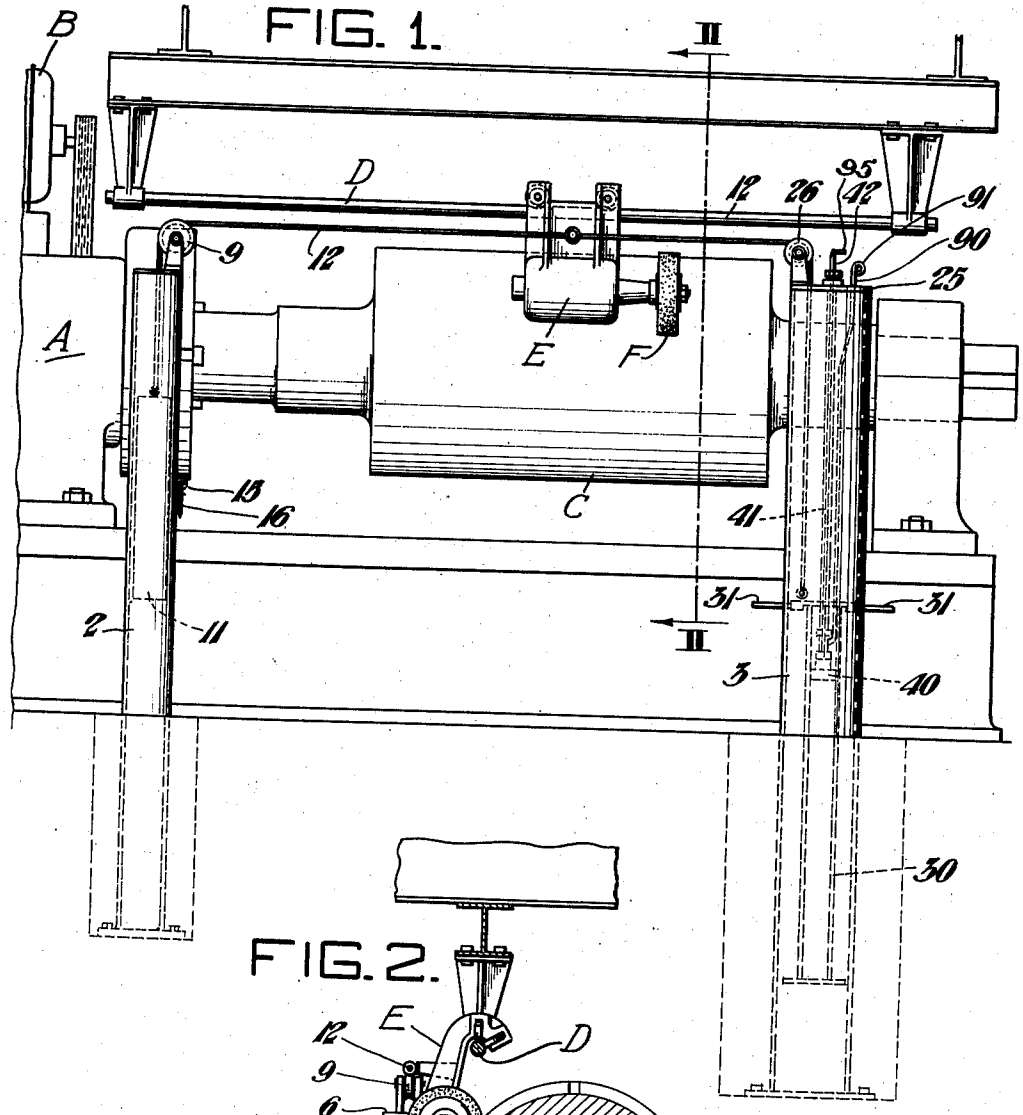


FIG. 2.

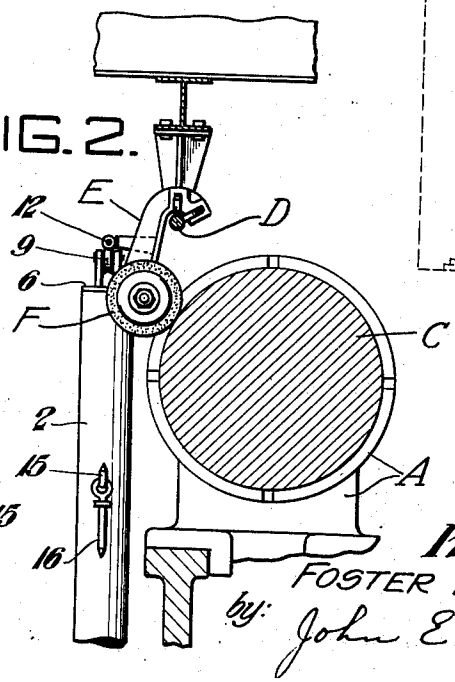
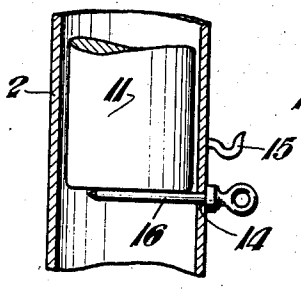


FIG. 3.



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FIG. 4.

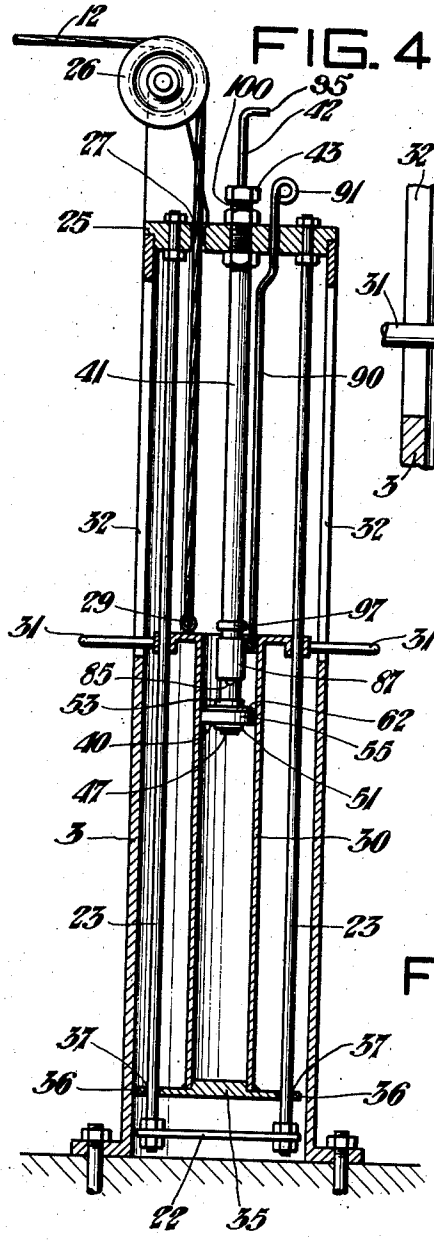


FIG. 5.

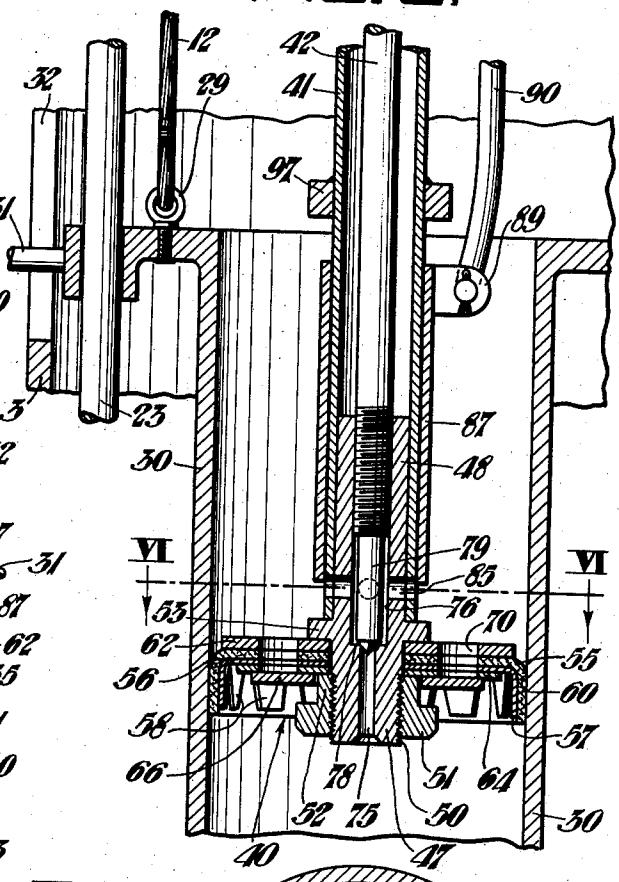
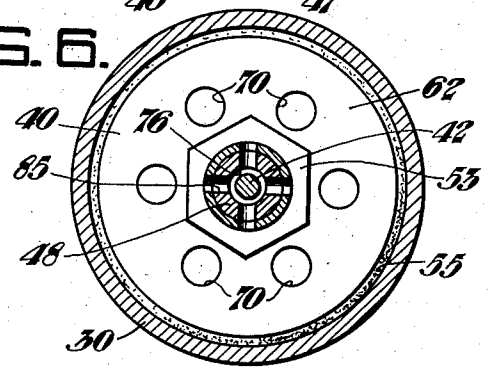


FIG. 6.



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2,221,349

UNITED STATES PATENT OFFICE

2,221,349

TRAVERSING MECHANISM

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Application November 27, 1939, Serial No. 306,384

4 Claims. (Cl. 185—27)

This invention relates to traversing mechanisms such as are used to move a tool across the face of a workpiece, although not limited thereto.

In my application, Serial No. 208,661, filed May 18, 1938, and entitled "Method and apparatus for lapping and polishing operations," there are disclosed certain improvements relating to the art of lapping wherein very highly polished surfaces are obtained. In the device of this prior application, there is embodied an instrumentality constructed and arranged to impart high frequency vibrations to hones. Before this hone may be applied to the surface of the workpiece, it is frequently necessary to provide the latter with a preliminary finish which may be obtained by the use of a suitable abrading means. In the device of the said prior application, the workpiece is illustrated as comprising a roll of a rolling mill and is rotated during not only the application of the hones, but also during the preliminary surfacing. Under these circumstances, and others of a similar nature, it is necessary that the preliminary surface, such as an abrading wheel, be moved very slowly across the surface of the workpiece and at a steady and predetermined speed.

It is among the objects of the present invention to provide a traversing mechanism which is highly efficient and yet cheap and easy to manufacture and maintain.

Another object is the provision of a device of the class described which may be readily installed on, and used in combination with, surfacing machines of existing design, such as the lapping device of the prior application referred to hereinbefore.

The invention, then, comprises the features hereinafter fully described and as particularly pointed out in the claims, the following description and the annexed drawings setting forth in detail a certain illustrative embodiment of the invention, this being indicative of but one of a number of ways in which the principles of the invention may be employed.

In said annexed drawings:

Figure 1 is a diagrammatic elevation of the mechanism of the present invention;

Figure 2 is a sectional elevational view on the line II—II of Figure 1;

Figure 3 is a fragmentary sectional elevation of a detail;

Figure 4 is an elevation, partly in section, of one of the cylinders and cooperating elements of the mechanism of the invention;

Figure 5 is an enlarged fragmentary sectional detail; and

Figure 6 is a sectional view on the line VI—VI of Figure 5.

Referring more particularly to the drawings, the letter A generally designates a workpiece carriage to which rotative movement is imparted by any suitable means, such as an electric motor B. A workpiece C is carried by the workpiece carriage A and suitably rotated thereby; being shown in the present instance as comprising a metal-working roll of a cold-reducing rolling mill, although it will be understood by those skilled in the art that any other workpiece may be substituted therefor, and that the traversing mechanism of the invention is susceptible of many other uses.

Alongside of the workpiece carriage A, and accordingly the workpiece C, there is disposed a rail D on which there is slidably mounted a support E. This support E carries a suitable abrading device, such as an abrading wheel, preferably of the type disclosed in my patent application, Serial No. 229,196, filed September 9, 1938, and entitled "Abrading wheel."

Adjacent each of the ends of the rail D there is disposed a vertical metallic tube, the one on the left hand end being designated at 2 and the one on the right hand end being designated at 3. Referring more particularly to Figure 1, the cylinder 2 is secured to a suitable base which is disposed below the floor. The top of the vertical metallic tube 2 carries a plug 6 having an opening adjacent which there is a pulley 9. Within the vertical metallic tube 2 there is a movable weight 11 having a rope 12 secured to the upper end thereof. This rope 12 is directed through the aperture in the plug 6 around the pulley 9 and toward the vertical metallic tube 3. Intermediate the ends of the vertical metallic tube 2, and on the right hand side thereof, there is an aperture 14 immediately adjacent which there is a hook 15. This hook 15 carries a pin 16 which may be inserted in the aperture 14 in order to support the weight 11 in the upper end of the vertical metallic tube for a purpose which will be later described.

Referring again to Figure 4, the vertical metallic tube 3 is suitably mounted in the floor in the manner of the vertical metallic tube 2. Within the vertical metallic tube 3 there is disposed a cross bar 22 to which there is suitably connected a pair of spaced vertically extending guide bars 23. These guide bars 23 are connected at the top of the vertical metallic tube 3 by means of a plug 25. This plug 25 carries a pulley 26 over which the rope 12 is directed, the latter passing

through an aperture 27 in the plug. Within the vertical metallic tube 3 there is disposed a second and concentric metallic tube 30 carrying on its upper end a pair of oppositely disposed horizontally extending bars 31, each of which extends through and projects from a vertical slot 32 in the upper end of the vertical metallic tube 3. The lower end of the inner metallic tube 30 is provided with a plug 35 carrying a pair of oppositely disposed ears 36, each of which is provided with an aperture 37 for accommodating one of the guide bars 23. The adjacent end of the rope 12 is secured to the ring 29 which is mounted on the inner metallic tube 30 adjacent the horizontally extending bars 31. A piston 40 is disposed in the inner metallic tube 30 and has secured thereto a vertically extending piston rod 41 which is connected to the plug 25 at the upper end of the vertical metallic tube 3. This piston rod 41 is tubular and carries therewithin a needle valve, generally designated at 42, which is confined at the upper end by a stuffing box 43.

The plug 35 in the lower end of the inner metallic tube 30 is sealed therein, as by "sweating," to provide an air tight chamber.

The lower end of the hollow piston rod 41 carries a thimble 47 providing a sleeve 48 which is telescoped within the former. The lower extremity of this thimble 47 is screw threaded, as shown at 50, in order to carry a nut 51 having an extension 52 of reduced external diameter. Between the extension 52 of the nut 51 and an intermediate flange portion 53 on the thimble 47 there is carried a cup leather 55 which fits snugly within the inner vertical metallic tube 30.

Referring more particularly to Figure 5, immediately beneath the cup leather 55 there is a metallic spring 56 having a downwardly turned flange 57 terminating in a serrated edge 58. This spring 56 applies pressure to the flange 60 of the cup leather 55, thereby making it possible for the cup leather to obtain a tight working fit in the inner vertical metallic tube 30. Immediately above the cup leather 55 and between it and the annular flange 53 on the thimble 47 there is a washer 62 which confines the cup leather 55 in its proper position. Immediately beneath the cup leather 55 there is disposed a washer 64 which holds the cup leather 55 and the metallic spring 56 in proper position.

Immediately beneath the washer 64 there is disposed a washer 66 which is free to operate within a limited distance, thereby enabling fluid to pass readily through suitable aligned apertures 70 in the washer 62, cup leather 55, metallic spring 56 and washer 64 when the cup leather 55 is being pulled upwardly in the vertical metallic tube 30. This, in turn, allows the oil to readily transfer from the upper side of the cup leather 55 to the lower side thereof.

The thimble 47 provides a small bore 75 which extends upwardly and terminates adjacent the upper surface of the annular flange 53. This small bore 75 communicates with a concentric but larger bore 76 and the termination of the latter provides an annular shoulder 78 for a purpose which will be later described.

Within the hollow piston rod 41 in the vertical inner metallic tube 30 there is disposed the rod of the needle valve, generally designated at 42, which terminates at its lower end in a needle 79 which fits against the annular shoulder 78 formed at the lower end of the larger bore 76 of the thimble 47. The lower end of the rod of the needle valve, generally designated at 42, extends through and screw threadedly engages, the sleeve 48, thus providing for the relative movement of the needle 79 with respect to the hollow piston rod 41, and, accordingly, the seating and unseating of the needle 79.

Immediately above the lower end of the hollow piston rod 41 there is provided a series of radial apertures 85 which extend through the sleeve 48 of the thimble 47 and, accordingly, communicate with the larger bore 76 of the latter.

Slidably mounted upon the lower end of the hollow piston rod 41 there is a sleeve 87 having an integral ear 89 to which there is pivotally connected a vertically extended rod 90. This vertically extending rod 90 projects through the plug 25 in the upper end of the vertical metallic tube 3 and is provided with a suitable handle portion 91. By sliding on the hollow piston rod 41, it will be readily observed that the sleeve 87 will, when in proper position, close the radial apertures 85 in the hollow piston rod 41 and thereby discontinue communication with the larger bore 76 in the thimble 47. When the sleeve 87 is in such position that the apertures 85 are closed, the flow of oil through the thimble 47 is stopped and this, in turn, stops the traversing mechanism from functioning. The rod 42 within the hollow piston rod 41 projects through the plug 25 in the upper end of the vertical metallic tube 3 and is provided with a suitable lever 95 in order that the needle valve may be carefully regulated.

At the upper end of the hollow piston rod 41 there is a stuffing box, generally indicated at 100, through which there extends the rod of the needle valve, generally indicated at 42.

In operation:

Referring more particularly to Figure 1, let it be assumed that the weight 11 is in the upper portion of the vertical metallic tube 2 and that the pin 16 is protruding through the aperture or hole 14, thus supporting the weight 11 in its uppermost position. If the pin 16 is removed, the force of gravity will tend to cause the weight 11 in the metallic tube 2 to descend. This, of course, will be resisted by the rope 12 and the mechanism disposed within the hollow vertical tube 3. If the piston between the cup leather 55 and the associated instrumentalities fit tightly in the vertical metallic tube 30, pressure will build up in the chamber and all motion will stop if all of the valves and vents are closed.

If at this time the handle 91 on the rod 90 be raised, to carry with it the sleeve 87 and thereby open the radial apertures 85, oil will start to leak from beneath the cup leather 55 and go into the space above the same. This rate of leakage will be controlled by the amount of opening of the needle 79 which, as previously stated, is controlled by the lever on the upper end of the rod of the needle valve, generally designated at 42. At this time the inner vertical metallic tube 30 will start to move upwardly over the cup leather 55 and the associated instrumentalities; and this, in turn, will give an equal amount of rope 12 to the left hand mechanism which is contained within the vertical metallic tube 2; thereby permitting the weight 11 to move downwardly.

In view of the fact that only a constant amount of oil is in the inner metallic vertical tube 30 in the vertical metallic tube 3, the oil merely transfers from beneath the piston and the cup leather 55 and associated instrumentalities to a position above the latter, and this allows the inner metallic vertical tube 30 to move upwardly over the

cup leather and associated instrumentalities and, of course, does not cause the oil to overflow.

With the rope 12 running from right to left (see Figure 1) at a predetermined speed, the device intended to be traversed by the mechanism of the present invention can be attached to said rope and the desired result obtained. In the present instance, the device intended to be traversed is, as previously pointed out, a support E for an abrading wheel F. Therefore, the support E is suitably clamped to the rope 12. After the traverse has been accomplished, in the present instance from one end of the roll C to the other, the operator merely disconnects the rope 12 from the upper end of the weight 11 after the latter has been elevated to the top of the vertical metallic tube 2 and held in this position by means of the pin 16. The operator then restores the device to be traversed (i. e. the abrading wheel F) to its original position and connects the rope 12 to the upper end of the weight 11 and the operation is repeated. In the meantime, the rope 12 will be slowly traveling at a predetermined speed.

This process can continue until the operator notices that he would not have enough travel to make a traverse. At this time, the operator grasps the opposed horizontally extending bars 31 which are carried on the upper end of the inner vertical metallic tube 30 and pulls down on the same with a force equal to the weight 11 plus an amount of power to overcome friction of the parts. Immediately the operator starts to move the inner tube 30 downwardly, the valve afforded by the washer 66 leaves its seat, thereby opening the apertures 70 in the cup leather 55 and associated instrumentalities. When these apertures open, the oil readily runs through the cup leather 55, etc. and allows the piston formed thereby to move to the top of the inner tube 30. That is to say, this is only a relative term, inasmuch as the piston formed by the cup leather 55 actually remains stationary but the cylinder slides over the same.

While I have shown and described one specific embodiment of the present invention, it will be seen that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of the invention, as defined by the following claims.

I claim:

1. A traversing mechanism comprising, in combination, a weight adapted for substantially vertical movement, a remotely disposed fluid check device, said weight being capable of overcoming said fluid check device, flexible means connecting said fluid check device and said weight, said fluid device comprising a fluid cylinder, a piston in said fluid cylinder, said piston having a fluid passage through its center, a series of fluid passages disposed radially with respect thereto, means for closing said first-named fluid passage, and separate means for closing said second-named fluid passage.

2. A traversing mechanism comprising, in combination, a weight adapted for substantially vertical movement, a remotely disposed fluid check device, said weight being capable of overcoming said fluid check device, flexible means connecting said fluid check device and said weight, said fluid device comprising a fluid cylinder, a piston in said fluid cylinder, said piston having a fluid passage through its center, a series of fluid passages disposed radially with respect thereto, means for closing said first-named fluid passage, and separate means for closing said second-named fluid passage, said last-named means having an adjustable control.

3. A traversing mechanism comprising, in combination, a weight adapted for substantially vertical movement, a remotely disposed fluid check device, said weight being capable of overcoming said fluid check device, flexible means connecting said fluid check device and said weight, said fluid device comprising a stationary fluid piston, a movable fluid cylinder secured to said flexible connecting means, said stationary fluid piston having a center aperture, a plurality of radially disposed apertures, an adjustable valve for closing said central aperture, and one way valve means for closing said radially disposed apertures.

4. A traversing mechanism comprising, in combination, a weight adapted for substantially vertical movement, a remotely disposed fluid check device, said weight being capable of overcoming said fluid check device, flexible means connecting said fluid check device and said weight, said fluid device comprising a stationary fluid piston having a central aperture and a series of radially disposed apertures, a hollow piston rod connected to said stationary fluid piston, said hollow piston rod having radially disposed apertures for communicating with said central apertures, a valve for closing said last named radial apertures, an adjustable valve for the center aperture in said fluid piston, one way valve means for the radial apertures in said stationary fluid piston, and a movable fluid cylinder, said movable fluid cylinder being secured to said flexible connecting means.

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