Feb. 14, 1939. A. O. MICKELSON ET AL. 2,147,308

COATING SHOE

Filed Sep 25, 1937 2 Sheets-Sheet 1

Fig. 1.

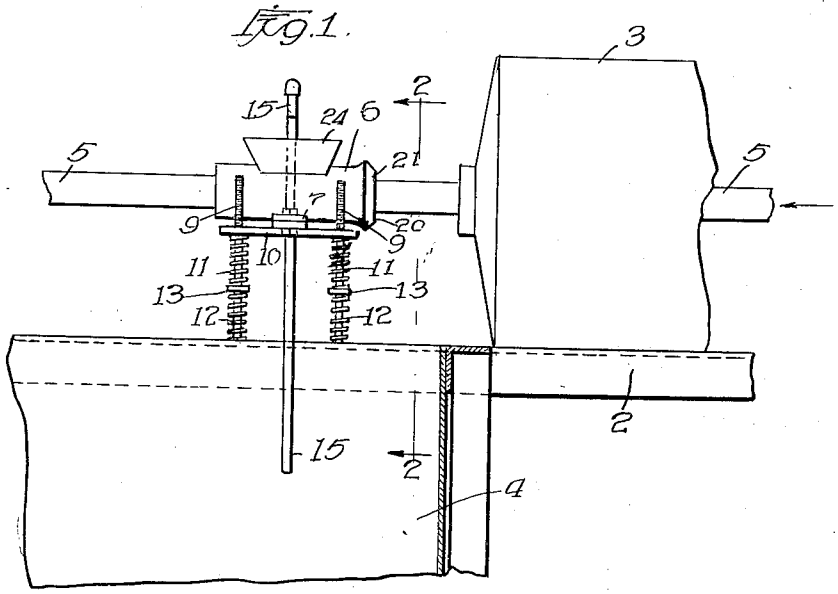
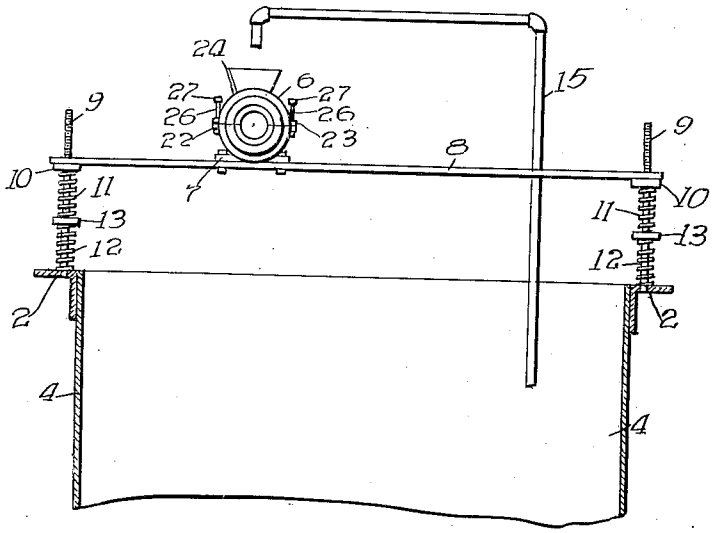



Fig. 2




Witness:

Harry R. L. White

Inventors:

Alfred O. Mickelson.

Alexander J. Druce,

By George H. Simmons

Atty.

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Fig 3.

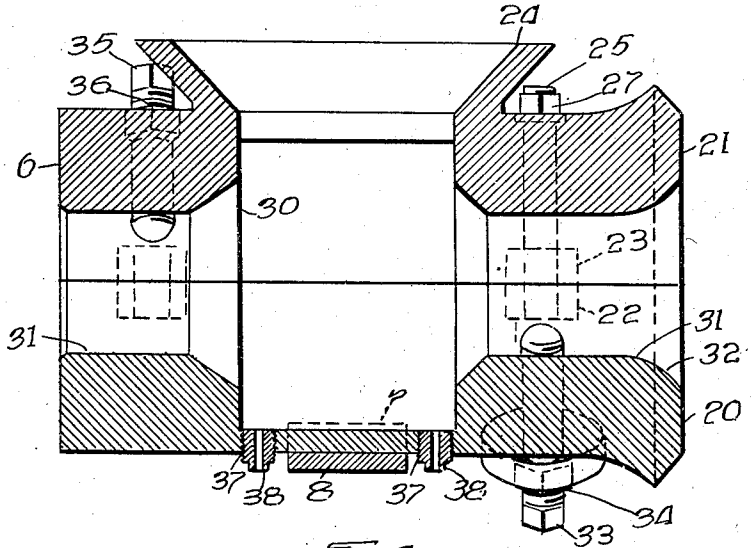
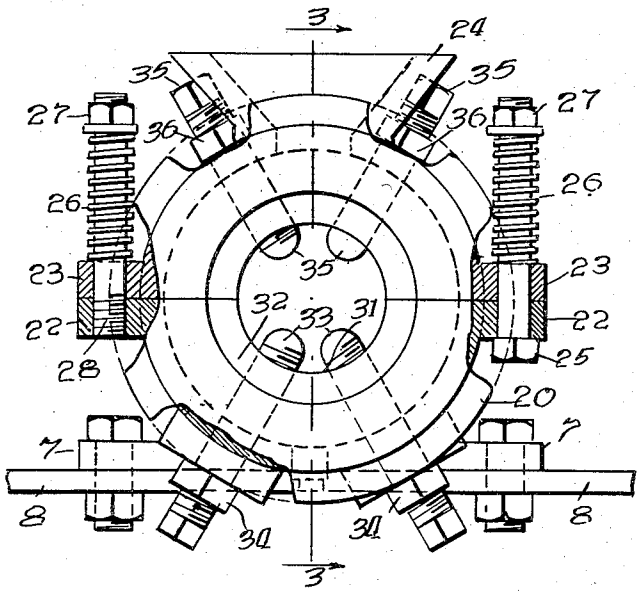



Fig 4




Witness:

Harry R. L. White

Inventors:

Alfred O. Mickelson,

Alexander T. Druci

By George H. Simmons

Atty.

Patented Feb. 14, 1939

2,147,308

# UNITED STATES PATENT OFFICE

2,147,308

## COATING SHOE

Alfred O. Mickelson, Chicago, and Alexander J. Duaei, Lombard, Ill.

Application September 25, 1937, Serial No. 165,647

9 Claims. (Cl. 91—32)

The present invention relates to shoes for applying coatings to pipes, rods and the like, and has for its principal object the production of a new and improved coating shoe.

Pipes that are to be used underground for conducting of gas, water or oil are frequently treated to prevent rust by an application of a coat of priming material which is followed by a coat of rust preventing compound over which is placed one or more thicknesses of impregnated paper or the like. Frequently this rust preventing treatment is applied before the pipe is laid, that is, the lengths of pipe received from the mill are treated before they are joined together to form a pipe line.

The work of treating the pipe lengths to prevent rust is frequently done in a stationary type of pipe coating machine such as, for example, the machine shown in our Patent No. 2,048,557, issued July 21, 1936. Machines of this type rotate the pipe around its own axis and simultaneously move it longitudinally therealong so that a particular point on the surface of the pipe travels in a helical path through the machine.

The rust preventing coatings most commonly used may be grouped into two classifications, the first, those compounds which are solids at ordinary temperatures and are heated in the machine to liquify them for applying to the pipe, and the second, so-called grease type compounds which are semi-liquid at ordinary temperatures and may be applied to the pipe without heat.

Stationary type machines are more frequently used in the application of rust preventing compounds of the first class, that is, those compounds which must be heated. The present invention relates generally to a machine of this type in which the compound is heated to a temperature sufficiently high to liquify it so as to form a liquid of about the consistency of cream. This heated liquid is pumped into a coating shoe through which the pipe is propelled and the liquid applied thereto by the shoe. Inasmuch as the liquid compound is at a relatively high temperature, the pipe will be relatively cold and there is a tendency for the coating compound to congeal as it comes into contact with the pipe. Inasmuch as the compound becomes tacky when partially cooled, it is necessary that the coating shoe be capable of maintaining the temperature of the liquid sufficiently high to insure its proper application to the pipe. A further object of the invention provides a new and improved coating shoe which is arranged to insure that the temperature of the compound brought into contact with the pipe will be sufficiently high to insure a proper application of the compound to the pipe.

As received from the mill, pipe usually comes in 20 foot lengths which may be slightly warped so that the pipe is not a true cylinder, and further, the pipe itself may not be truly round. In order to permit the coating machine to handle pipe that is not truly cylindrical, it is necessary that the coating shoe be mounted in the frame of the machine so as to be capable of limited movement up and down and crosswise of the machine.

A still further object of the invention is the provision of a mounting device for holding the coating shoe in the machine which permits the shoe a limited movement vertically and horizontally of the machine.

The thickness of the coating that is to be applied to the pipe is determined by the dimensions of the shoe, and inasmuch as the desired coating is relatively thin the shoe will conform fairly closely to the outside dimensions of the pipe. Should the pipe be out of round, there is danger that it might bind in the shoe unless the shoe is arranged to adjust itself to conform to slight irregularities in the pipe.

Still a further object of the invention lies in the provision of a coating shoe arranged to automatically conform to an irregularity in the pipe.

Further objects of the invention not specifically mentioned here will be apparent from the detailed description and claims which follow, reference being had to the accompanying drawings in which a preferred embodiment of the invention is shown by way of example and in which:

Figure 1 is a fragmentary elevational view, partly in section, showing the mounting of the coating shoe in a machine;

Figure 2 is an elevational view taken substantially along the line 2—2 of Figure 1 looking in the direction of the arrows;

Figure 3 is a cross-sectional view through the shoe taken along the vertical plane such as 3—3 of Figure 4 looking in the direction of the arrows; and

Figure 4 is an end elevational view of the shoe, partly in section.

As will be seen in Figure 1 of our above-mentioned Patent No. 2,048,557, the pipe coating machine of the type of which the present invention relates, comprises side-rail members upon which is mounted a propelling mechanism that is operable to rotate the pipe and to simultaneously advance it longitudinally. These frame

members also carry a kettle and a coating means through which the pipe is driven by the propelling mechanism. The present invention relates particularly to the coating means.

As will be seen in Figure 1, the side-frame members 2 support the propelling mechanism indicated generally at 3 and the kettle or tank 4. Pipe 5 extends through the propelling mechanism and over the tank.

The coating shoe to which the present invention relates is indicated generally at 6 and comprises a generally cylindrical body consisting of two sections, the lower one of which is provided with feet 7 that rest upon a cross-bar 8 and are secured thereto in any preferred manner such as bolts. The side frame members 2 of the machine are equipped each with two threaded shafts or bolts 9, spaced equi-distant from a plane through the center of the shoe and extending transversely of the machine. The cross-bar 8 is fixed to short bars 10 that extend longitudinally of the machine above the side frame members 2, the bars 10 being perforated to permit them to be slipped down over the bolts 9. The springs 11 encircle the bolts 9 and engage the bars 10. The second set of springs 12 is disposed beneath the springs 11 by suitable washers 13. By this arrangement the bars 10 and the shoe supported thereby are mounted upon the side frame members 2 of the machine by a mounting which is resilient and permits a limited movement of the shoe in all directions, the perforations in the bars 10 being substantially larger than the bolts 9. Nuts 14 may be threaded upon the bolts 9 above the bars 10 to prevent these bars and the shoe carried thereby from being accidentally raised off of the machine.

The liquid in the kettle 4 is pumped by a suitable pump (not shown) through a pipe 15 that discharges immediately above the shoe so that the liquid may fall into it.

As will be best seen in Figures 3 and 4, the shoe comprises a lower section 20 and an upper section 21, each of these sections being approximately semi-cylinders. The lower section 20 contains the feet 7 by which the shoe is mounted upon the mounting bar 8 and also contains ears 22, the upper surfaces of which are flush with the upper edge of the section.

The upper section 21 contains ears 23 which register with the ears 22 and also contains a funnel 24 that is located at the center of the section and extends thereabove.

Ears 22 and 23 may receive through bolts such as 25, around which springs 26 are placed and held by nuts 27 threaded on the bolts. The springs engage the upper faces of ears 23 and serve to hold the two sections of the shoe together. Through bolt 25 may be replaced by a stud bolt 28 threaded into the ear 22 as shown at the left-hand side of Figure 4, if desired.

The funnel 24 opens into a central large diameter cavity 30 located within the shoe. Coaxial openings 31 extend from this cavity to the ends of the shoe, the opening at the end of the shoe through which the pipe enters being flared as shown at 32 to form an entrance port for the pipe.

The diameter of the coaxial openings are held accurate so as to determine the thickness of the coating of compound applied to a pipe by the shoe, such coatings usually having a total thickness of not more than ⅛ of an inch.

In order to insure that the coating thus applied will be uniform around the surface of the pipe, there are provided guide screws 33 threaded into the bottom section 20 of the shoe and locked in place by jam nuts 34. These guide screws extend into the coaxial openings and are provided with rounded ends adapted to engage the pipe. The screws preferably are hardened to reduce their wearing and thereby lengthen their life.

Similar adjusting screws 35 are threaded onto the upper section 21 of the screw and locked in place by jam nuts 36.

Ordinarily it is not necessary to use a pair of adjusting screws 33 and a pair of adjusting screws 35 at each end of the shoe, but rather screws 33 will be located at the end of the shoe through which the pipe enters and screws 35 will be located at the opposite end of the shoe, as shown in Figure 3. By properly adjusting screws 33 and 35, the pipe can be supported in the shoe so that its axis is in substantial alignment with the axis of the openings 31, and as a result the coating applied to the pipe will be uniform.

The hot liquid pumped into the funnel 24 through pipe 15 flows into cavity 30 and around the pipe, which extends therethrough. Some of the liquid will leak out of the shoe through the openings 31 and fall back into the kettle 4. In order to increase the flow of liquid in the cavity 30 thereby to insure that the compound will be maintained at a sufficiently high temperature, we have provided bleeder ports 37 in the bottom section 20 of the shoe. These ports are two in number and located upon opposite sides of the feet 7. Plugs 38 are threaded into these ports, the plugs being drilled to permit the compound to escape therethrough. By varying the size of the openings in the plugs, the rate of flow of the compound through the cavity may be governed, and in certain instances when the compound being used congeals at a relatively high temperature, plugs 30 may be omitted entirely.

In the operation of the machine, pipe is threaded through the propelling mechanism and into the shoe. The hot compound is pumped into the shoe through funnel 24 and an appreciable volume of this compound is maintained in the cavity 30 which completely encircles the pipe. As the pipe advances, the compound is coated upon it, the thickness of the coating being determined by the opening through which the pipe leaves the shoe. Should the pipe be slightly out of true so that it wobbles as it comes out of the propelling head, the shoe is moved with respect to the frame through the action of mounting bars 8 and 10 and the springs 11 and 12. Should the pipe be out of round, the two sections of the shoe will be sprung apart against the tension of springs 26 to permit the pipe to pass through the shoe without binding. Should there be a coupling in the pipe, the shoe will likewise open to permit the coupling to pass through it.

We have found that by equipping the coating machine with a shoe for each size pipe to be handled by the machine, universal operation results. The shoes can be changed from one pipe size to another merely by unbolting the shoe from the mounting bar 8 and replacing it with a shoe of the proper size.

The improved shoe of our invention is found to possess many advantages; it is economical to manufacture, it does not readily wear out, and by proper adjustment of the bleeder ports can be made to handle a variety of different compounds under varying conditions.

In the prior art devices of which we are aware, the coating shoes have merely applied the com-

pound to the pipe and so called "doctor blades" were employed to smooth out the coating and to trim it down to the proper thickness. Since these doctor plates are invariably mounted some distance from the shoe, we have found that the compound oftentimes is too cold when in contact with the doctor blades. As a result, the coating applied to the pipe is rough and is not uniform in thickness. In our improved shoe this fault is remedied and since the shoe becomes hot in use the finished coating is smooth and uniform at all times.

Having thus complied with the statutes and shown and described our invention, what we consider new and desire to have protected by Letters Patent is pointed out in the appended claims.

What is claimed is:

1. A coating shoe comprising a generally cylindrical body formed of complementary sections and having an internal cavity, there being coaxial openings of smaller diameter than the cavity extending from the ends thereof to the ends of said body, ears on said sections, means engaging said ears for holding said sections together, funnel means formed integral with one of said sections and communicating with said cavity, and means formed integral with another one of said sections for mounting said shoe.

2. A coating shoe comprising a generally cylindrical body formed of complementary sections and having an internal cavity, there being coaxial openings of smaller diameter than the cavity extending from the ends thereof to the ends of the body, ears on said sections, spring pressed means engaging said ears for holding said sections together, funnel means formed in one of said sections and communicating with said cavity, and means on the other section for mounting said shoe.

3. A coating shoe comprising a generally cylindrical body formed of complementary sections and having an internal generally cylindrical cavity, there being cylindrical openings coaxial with said cavity and extending therefrom to the ends of said body, the end of one of said openings being flared to form an entrance port for said cavity, means for holding said sections together, funnel means communicating with said cavity, there being bleeder ports opposite the funnel means and leading from the cavity, and centering means extending through said body and into said openings.

4. A coating shoe comprising a generally cylindrical body formed of a plurality of sections and having an internal generally cylindrical cavity, there being cylindrical openings coaxial with said cavity and extending therefrom to the ends of said body, the end of one of said openings being flared to form an entrance port for said cavity, means for holding said sections together, funnel means communicating with said cavity, there being bleeder ports opposite the funnel means and leading from said cavity, and screw adjusted centering means extending through said body and into said openings and adapted to position a pipe co-axial with said body.

5. A coating shoe comprising a generally cylindrical body formed of a plurality of sections and having an internal generally cylindrical cavity, there being cylindrical openings co-axial with said cavity and extending therefrom to the ends of said body, the end of one of said openings being flared to form an entrance port for said cavity, means including springs for yieldably holding said sections together, funnel means communicating with said cavity, there being bleeder ports opposite the funnel means and leading from said cavity and centering means extending through each of said plurality of sections and into said openings.

6. A coating shoe adapted to be fitted over a pipelike member comprising a plurality of sections which between them form a generally cylindrical body having small diameter end openings and a large diameter central cavity, yieldable means for holding said sections together, means for guiding a coating material into said cavity, an adjustable guide means in each of said sections for centering the same with respect to the axis of the pipelike member.

7. In a coating machine a pair of frame members, a pair of supports fixed to and upstanding from each of said frame members, spring means encircling each of said supports, support bars extending between the supports of said pairs and resting on said spring means, a mounting bar extending between said support bars and fixed thereto, a coating shoe fixed to said mounting bar, and means on said supports for retaining said support bars thereon.

8. Means for mounting a coating shoe upon the side frame members of a coating machine so as to permit limited movement of the shoe with respect to the machine, comprising upstanding supports upon each frame member, spring means associated with the supports, a mounting bar upon which the shoe is fixed, means engaging the mounting bar and spring means for supporting the mounting bar and shoe, and stop means upon said upstanding supports for limiting movement of the mounting bar and shoe away from said frame members.

9. Means for mounting a coating shoe upon the frame members of a coating machine so as to permit limited movement of the shoe vertically and horizontally with respect to the frame members, comprising, threaded rods fixed to and upstanding from said frame members, there being a pair of said rods on each frame member, spring means encircling each of said rods, support bars disposed normally in substantial parallelism with said frame members, said support bars containing perforations substantially larger than said rods and through which the rods extend, a mounting bar extending between and fixed to said support bars, a coating shoe fixed upon said mounting bar, and nuts threaded upon said rods above said support bars for limiting movement of the bars away from said frame members.

ALFRED O. MICKELSON.
ALEXANDER J. DUAEI.