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OR 2,111,865

March 22, 1938. W. L. MacKENZIE 2,111,865

COATING APPARATUS

Filed Dec. 28, 1934 2 Sheets-Sheet 1

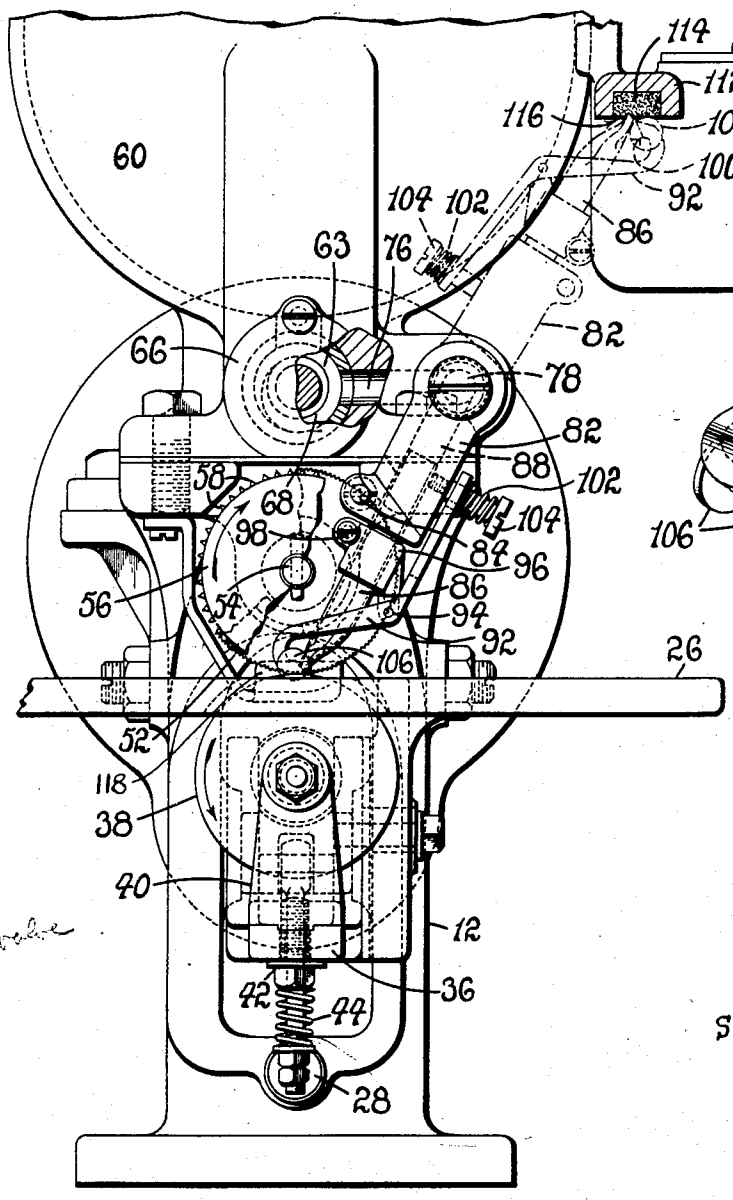


Fig. 1.

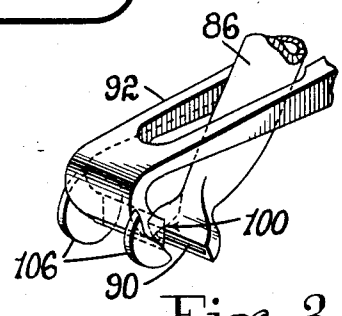


Fig. 3.

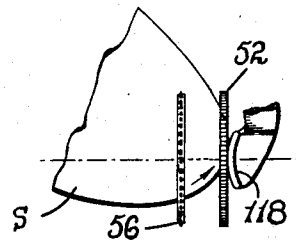


Fig. 2.

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Filed Dec. 28, 1934 2 Sheets-Sheet 2

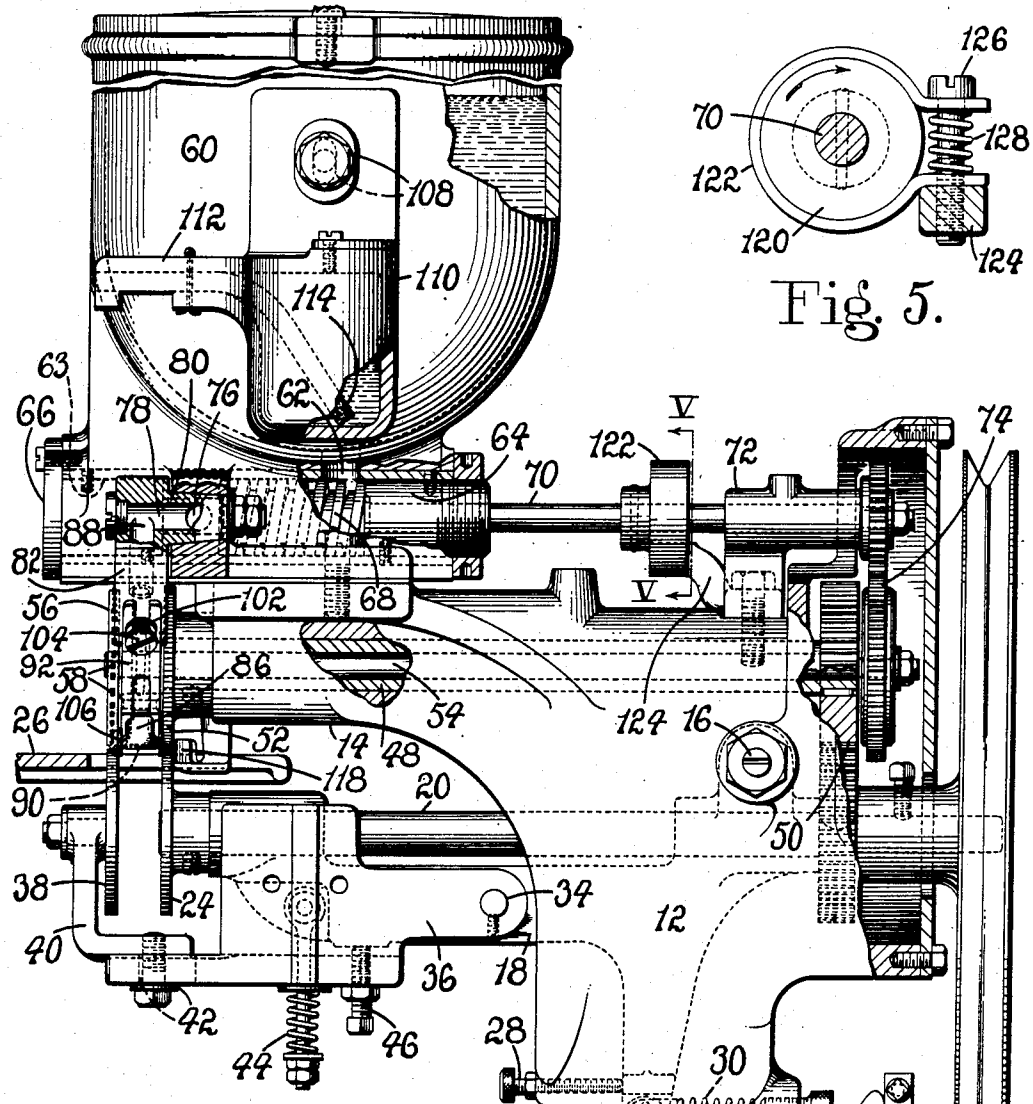


Fig. 4.

Fig. 5.

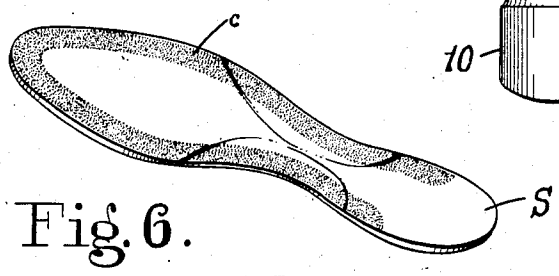


Fig. 6.

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UNITED STATES PATENT OFFICE

2,111,865

COATING APPARATUS

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Application December 28, 1934, Serial No. 759,575

17 Claims. (Cl. 91—43)

My invention relates to apparatus by which a coating substance may be applied to work-pieces, the embodiment herein disclosed being especially adapted for the application of cement in marginal bands to shoe-soles.

In work of the character above indicated, a heavy adhesive such as pyroxylin is frequently employed, and it is desired to apply a coat of considerable thickness and of substantial uniformity throughout the area to be covered. It is an object of this invention to provide a simple and convenient apparatus by which this end may be attained. I therefore combine with an applying member, preferably a nozzle from which the cement is extruded, means for delivering to it a coating substance, such means being shown herein as a rotatable screw, together with means for transmitting to the delivering means movement of the work as it is advanced for the coating operation. With this arrangement, the delivery is made positively, only when required and in amounts proportionate to the area to be coated. To thus transmit the movement of the work to the delivering means, such a controlling member as a roll rotated by said work may be utilized, this being geared to the delivering means to produce its rotation. The delivering and controlling roll may be associated with feeding means, as a pair of driven rolls. With the delivery-controlling member I prefer to associate means for variably resisting its movement, as by a brake device acting upon it. This retarding effect upon the advance of the work may act to swing it laterally and thus maintain it in contact with an edge-gage, so the applied band of adhesive will be uniformly related to the periphery of a work-piece. The coating-applying nozzle may be movable between an active or operating position and an inactive or idle position, and to insure delivery only when it is in the active position, and to prevent said nozzle from becoming clogged by hardened adhesive when it is inactive, a closure or valve for the nozzle-orifice is provided, and with this closure co-operates means for opening the orifice in the inoperative position, the closure being also opened by contact of said means with the work. In the active position, delivery of the adhesive is made from the open nozzle, and in the inactive position, a liquid, as a solvent for the adhesive, may be applied to the orifice to keep it clear. I have herein shown this application to be effected by engagement of the open nozzle with absorbent material which extends into a receptacle containing the chosen solvent and mounted with the receptacle from which the nozzle receives the adhesive.

One of several forms which my invention may assume is illustrated in the accompanying drawings,

Fig. 1 showing the apparatus in broken end elevation;

Fig. 2 being a diagrammatic plan view illustrating the retarding action of the delivery-controlling roll;

Fig. 3, a perspective view of the delivery-end of the nozzle;

Fig. 4, a broken side elevation of the apparatus;

Fig. 5, a sectional detail of the brake device taken on the line V—V of Fig. 4; and

Fig. 6, a perspective view of a sole coated by the apparatus.

Upon a frame-standard **10** is mounted a head **12** having a laterally extending fixed arm **14**. Pivoted at **16** upon the head is a primary carrier-arm **18** in which a shaft **20** is journaled, this being driven continuously during the operation of the apparatus by a pulley **22** belted to a source of power. The shaft has secured to its outer extremity a feed-disk or roll **24** for advancing the work-pieces to be operated upon, this disk extending through an opening in a work-supporting table **26** carried by the arm **18**. This arm and the elements which it bears are held normally elevated by a spring **30** to an extent determined by a stop-screw **28**. Treadle-connections **32** permit the primary arm **18** to be lowered for the application of work to the table. Pivoted at **34** upon the primary arm is a secondary arm **36** carrying a freely rotatable work-supporting disk or roll **38** axially alined with the roll **24** and spaced laterally therefrom. The roll **38** may turn upon a bracket **40** secured to the arm **36** by a slot-and-screw connection **42**, which allows the distance between it and the roll **24** to be varied to correspond to applied bands of cement of different widths. A spring **44** urges the arm **36** and its disk up, to hold normally against the primary arm a stop-screw **46** threaded through the secondary arm. The roll **38** may thus yield independently of the driven roll **24** to better conform to the work.

Journaled in the frame-arm **14** is a horizontal shaft **48** rotated from the shaft **20** at an equal-speed ratio by spur-gearing **50**. Fast upon the shaft **48** in vertical alinement with the roll **24** is a second feed-disk or roll **52**. This is shown as having a toothed periphery to furnish better engagement with the work. The shaft **48** is pref-

erably tubular and through it passes a concentric shaft 54. This shaft has secured to it a disk or roll 56 which may have peripheral work-engaging prongs 58 and is undriven by the power supplied to the machine. The rolls 52 and 56 are spaced laterally to substantially the same extent as the lower rolls 24 and 38, with which they respectively register. The roll 56 is rotatable by the work as it is advanced by rolls 24 and 52 for the operation upon it, this movement being for the purpose of controlling the delivery of a coating substance, as will now be described.

The cement or other liquid which is to be applied is contained in a receptacle 60 carried upon the frame-arm 14, it passing therefrom through an opening 62 into a horizontal cylindrical feed-chamber 63 closed at its opposite extremities by plugs 64 and 66. Rotatable in the chamber beneath the opening 62 is a feed-screw 68. From the screw through the plug 64 a horizontal shaft 70 extends, having a bearing at 72 in the frame. Spur-gearing 74 rotates the shaft 70 from the shaft 54, the screw preferably turning more rapidly than the roll 56. The direction of rotation of the screw is such that it forces the liquid from the opening 62 into the portion of the chamber 63 between the screw and the plug 66, thence said liquid may pass through a passage 76 into a passage 78 formed in a tapered valve-plug 80 turning in a chamber situated in a boss projecting from the bottom of the receptacle 60 at one side of the feed-chamber 63. The plug 80 is shown formed as a part of a nozzle-body 82, which is divided and has clamped in it by a screw 84 the delivery-portion 86 of the nozzle. A passage 88 joins the plug-passage 78 to the delivery-orifice 90 of the nozzle. With the nozzle turned down, as shown in full lines in Fig. 1, about the pivotal mounting furnished by the plug 80, its orifice 90 is between the rolls 52 and 56 and somewhat spaced above the work-supporting surface of the table 26, it being in operating position with the plug-passage 78 registering with the passage 76, so that when the screw 68 is rotated, cement will be delivered from the receptacle-opening 62 through the nozzle-orifice 90. When the nozzle is turned up to the dash-and-dot-line-position of Fig. 1, the plug-passage passes out of registration with the passage 76 and the delivery of cement is cut off.

That there may be no flow from the nozzle-orifice 90 until it is properly related to the work, there is mounted upon the nozzle a closure for said orifice. This is herein shown as furnished by a valve-lever 92 fulcrumed at 94 upon a bracket 96 clamped to the nozzle-portion 86 by a screw 98. An inclined face 100 upon the extremity of the lever, as best indicated by the dash-and-dot line showing of the raised or inoperative position of the nozzle in Fig. 1, is forced over the orifice 90 by a spring 102. This spring is interposed between the lever and a screw 104 threaded into the nozzle-body 82 and passes through a lever-opening. The closure is opened in the active position of the nozzle to permit the cement to flow, by contact-projections 106, shown as in the form of disks and secured to the lever at each side of the face 100, so they may be engaged by the work-pieces as these are introduced between the lower rolls 24 and 38 and the upper rolls 52 and 56. The contact of the valve-portions 106 with the work is between the nozzle and the rolls 52 and 56, thereby avoiding contact with the applied band of cement. As long as work is in position to be coated, the valve will be lifted from the nozzle-opening allowing the cement to be delivered. As soon as said work passes from beneath the nozzle, the projections release the valve, which is closed by the spring 102.

Were the nozzle swung to its idle position and the cement allowed to dry in the orifice 90, said orifice would become clogged and the valve-face 100 stuck to it, so it would be difficult to clear. This I avoid by opening the nozzle when it is inactive and applying thereto a solvent for the cement. If pyroxylin is being used, this solvent may be acetone. Secured to the cement-receptacle 60 by a slot-and-screw connection 108, so it may be adjusted as to height, is a relatively small solvent-receptacle 110. From one side of the upper portion of this receptacle projects a bracket 112, the under side of which is recessed, and in this recess and extending to a point near the bottom of the receptacle 110 is a strip of absorbent material 114, which may be of felt and contains a body of liquid supplied from the receptacle. The strip at the under side of the bracket presents an applying surface 116, which is so located that it receives contact of the delivery-end of the nozzle when this is elevated. As appears in the dash-and-dot-line-position, the valve-projections 106 strike the felt, swinging the valve-lever 92 clear of the orifice 90, which is forced into the wet felt. Hardening of the cement at the orifice is thus prevented, and the closure is held where it can not adhere to the nozzle.

To insure the application of the band of cement in the correct relation to the area to be coated, the work-pieces are located laterally beneath the nozzle by an edge-gage 118 depending from the frame-arm 14 at the opposite side of the feed-rolls 24 and 52 from the delivery-controlling roll 56. To hold the edges of the work in contact with the gage with little effort on the part of the operator as the direction of work-movement changes because of the peripheral curvature, I apply a retarding force to the work through the cement-controlling roll 56. This, with the opposite advancing force of the feed-rolls 24 and 52, forms a couple tending constantly to swing the work around its point of contact with the roll 56 in the direction indicated by the arrow in Fig. 2, thus turning and urging it toward the gage. A convenient means for obtaining a variable resistance which may be caused to produce the desired effect is through the application of a brake to the screw-shaft 70 which the roll 56 rotates. As appears in Figs. 4 and 5, there is secured to the shaft a drum 120 encircled by a brake-band 122. This band is supported at one extremity by a bracket 124 rising from the head 12 and it may be drawn into frictional engagement with the periphery of the drum by a screw 126. A spring 128 acts upon the band to relieve the pressure upon the drum as the screw is backed off. This device enables the operator to obtain readily the force necessary to turn the work so as to keep it in contact with the gage 118, without unduly resisting advance of said work and its actuation of the cement-delivering screw 68.

Considering the operation of the apparatus, and assuming that work such as the sole S shown in Fig. 6 is to have applied to it a marginal band c of cement, the receptacle 60 is supplied with the adhesive to be employed and the receptacle 110 with the nozzle-clearing solvent. A nozzle-portion 86 is clamped in place, it having an orifice

90 of a width substantially equal to that of the band *c*, and the rolls 38 and 56 are correspondingly adjusted. The feed-rolls 24 and 52 and the work-supporting and the controlling rolls 38 and 56 are arranged close to the opposite sides of the nozzle in its lowered position. Depressing the rolls 24 and 38 by the treadle-connections 32, the operator inserts a sole between the upper and lower rolls over the table 26 against the gage 118 and allows the lower rolls to rise. The engagement of the work with the valve-projections 106 removes the closure from the nozzle-orifice 90, and cement is delivered therefrom upon the margin of the sole. Said sole is gripped and fed forward by the rotation of the rolls 24 and 52 and the roll 56 is thereby turned, positive movement being insured by the entrance of the roll-prongs 58 into the work. This rotates the screw 68 and cement is thereby forced through the passages 76 and 78, now open because of the position of the plug 80. Since the rate of rotation of the delivering screw is proportionate to the advance of the sole, a uniformly thick band of cement will be applied throughout its length, and when the application is completed and the sole removed from between the rolls, the rotation of the screw stops and the cement-delivery ceases. The rate of this delivery may be altered, to suit different kinds of work, by changing the ratio of the gearing 74. Under the influence of the brake device 120, 122, the roll 56 sufficiently retards the advance of the portion of the work engaged by said roll to swing the edge of the sole toward and hold it against the gage 118, so the band of cement is symmetrically applied. If the use of the apparatus is to be discontinued for a time, the nozzle is raised into engagement with the solvent-moistened surface 116, the closure being thereby separated from the orifice 90 and the nozzle receiving an application of the solvent to prevent clogging.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In combination, a receptacle for a coating substance, an applying member, a rotatable member delivering the coating substance from the receptacle to the aplying member, a power driven feed mechanism for advancing work in cooperation with the applying member, an undriven roll positioned adjacent to the feed mechanism and contacting with the work, and driving connections between the last-named undriven work-contacting roll and the delivery member whereby rotation of said roll by the work is transmitted to said rotatable delivery member.

2. In combination, a receptacle for a coating substance, an applying member, a rotatable member delivering the coating substance from the receptacle to the applying member, driven feed rolls for advancing work in co-operation with the applying member, a roll rotatable by the advancing work, and gearing connecting the last-mentioned roll to the delivery member.

3. In combination, a receptacle for a coating substance, an applying member, a rotatable member delivering the coating substance from the receptacle to the applying member, a rotatable roll for advancing work in co-operation with the applying member, a tubular shaft upon which the roll is mounted, a shaft rotatable within the tubular shaft, a roll carried upon the inner shaft for contact with the work and adapted to be rotated thereby as a piece of work is presented to the machine, and connections between the inner shaft and the delivery member for rotating the latter.

4. In combination, a receptacle for a coating substance, an applying member to which the coating substance is delivered from the receptacle, means for controlling the delivery of coating substance, upper and lower driven feed-rolls between which the work is gripped and by which it is advanced, a work-supporting roll situated at one side of the lower feed-roll, and a work-contacting roll situated above the work-supporting roll and operatively connected to said controlling means thereby to govern the delivery of the coating substance from the receptacle.

5. In combination, a receptacle for a coating substance, an applying member, a rotatable member delivering the coating substance from the receptacle to the applying member, driven feed mechanism for advancing work in co-operation with the applying member, a work gage adjacent thereto, an idle roll outside of the feed mechanism and rotated by contact with the work, frictional means for retarding the work-contacting roll to produce a drag upon the work to hold the work against the gage as the work is advanced by the feed mechanism, and connections to the work-contacting roll for rotating the delivery member.

6. In combination, a receptacle for a coating substance, an applying member to which the coating substance is delivered from the receptacle, upper and lower driven feed-rolls by which the work is advanced, a gage at one side of said feed rolls, a work-suporting roll situated at the other side of the lower feed-roll, a controlling roll rotatable by the work and opposing the work-supporting roll, mechanism movable with said controlling roll effecting a delivery of the coating substance from the receptacle to the applying member proportionate to the number of turns of the controlling roll, and a brake acting upon the controlling roll for swinging the work into contact with the gage.

7. In a coating apparatus, a receptacle for a coating substance, a coating-applying member, coacting rolls driven to feed the work to bring successive portions thereof into cooperation with the applying member, an edge-gage adjacent to one side of the feed-rolls, a work-driven roll situated at the opposite side of the feed-rolls from the edge-gage and frictionally retarding progress of the work to swing the work into contact with the edge-gage, and a rotatable member connected to the work-driven roll and delivering coating substance from the receptacle to the applying member.

8. In a coating apparatus, a receptacle for a coating substance, a coating-applying member, superposed rolls driven to feed the work to bring successive portions thereof into cooperation with the applying member, an edge-gage adjacent to one side of the feed-rolls, a work-actuated roll situated at the opposite side of the feed-rolls from the edge-gage, a rotatable member connected to the work-actuated roll and delivering coating substance from the receptacle to the applying member, and a brake device acting upon the delivering member to swing the work into contact with the edge-gage.

9. In a coating apparatus, a nozzle mounted for movement between active and inactive positions, a closure for the nozzle, there being means cooperating with the closure and operable by engagement with the work when the nozzle is in active position to open the nozzle, and means on

the machine for engagement with said co-operating means when the nozzle is in inoperative position.

10. In a coating apparatus, a nozzle having a delivery-orifice, a driven feed roll engaging the work adjacent to the nozzle to move it past the nozzle, and a valve movable upon the nozzle to open and close the orifice, said valve being provided with a portion for dragging contact with the work laterally of the nozzle and between it and the roll thereby to open the valve without disturbing the cement applied as the work is fed past the nozzle.

11. In a coating apparatus, a nozzle having a delivery-orifice, a rotatable roll engaging the work adjacent to each side of the nozzle, one of said rolls being driven to feed the work past the nozzle, a valve movable upon the nozzle to open and close the orifice, said valve being provided with a portion beside the nozzle for contact with the work between the nozzle and each roll thereby to open the valve without disturbing the cement applied as the work is fed past the nozzle.

12. In a coating apparatus, a nozzle mounted for movement from a depending applying position to an inverted, inoperative position, and an absorbent member in the path of movement of the nozzle for applying a liquid to the delivery orifice of the inverted nozzle in its inoperative position.

13. In a coating apparatus, a nozzle movable between an operating position and an inoperative position and having a delivery-orifice, a closure for said orifice, a liquid-receptacle, and an applying member of absorbent material receiving liquid from the receptacle and into engagement with which the nozzle and its closure moves.

14. In a coating apparatus, a nozzle movable between an operating position and an inoperative position, a liquid-receptacle, and absorbent material receiving liquid from the receptacle and presenting an applying surface into engagement with which the nozzle moves in its inoperative position.

15. In a cementing apparatus, a frame, a cement-receptacle and a solvent-receptacle mounted upon the frame, a nozzle pivoted upon the frame and having an orifice to which delivery is made from the cement-receptacle, and absorbent material extending into the solvent-receptacle and positioned in the path of movement of the nozzle orifice and into engagement with which the nozzle may be swung.

16. In a cementing apparatus, a frame, a cement-receptacle and a solvent-receptacle mounted upon the frame, a nozzle pivoted upon the frame and having a delivery-orifice, a valve pivoted upon the nozzle, and absorbent material extending into the solvent-receptacle and positioned for engagement with the valve as the nozzle is swung.

17. In a cementing apparatus, a frame having a feed-chamber and a valve-chamber opening therefrom, a receptacle delivering to the feed-chamber, a screw rotatable in said feed-chamber to force cement toward the valve chamber, a plug valve rotatable in the valve-chamber, a nozzle carried by the plug and adapted in one position of the valve to receive cement from the feed chamber, a roll rotatable at each side of the nozzle, one of which rolls is driven to feed the work past the nozzle and the other of which is rotated by the work, independently rotatable concentric shafts by which the rolls are carried, means for driving the shaft carrying the feed roll, and gearing connecting the other shaft and the screw.

WILBUR L. MacKENZIE.