Oct. 18, 1938. W. C. HUEBNER 2,133,516

COATING MACHINE

Original Filed Sept. 4, 1936 4 Sheets-Sheet 1

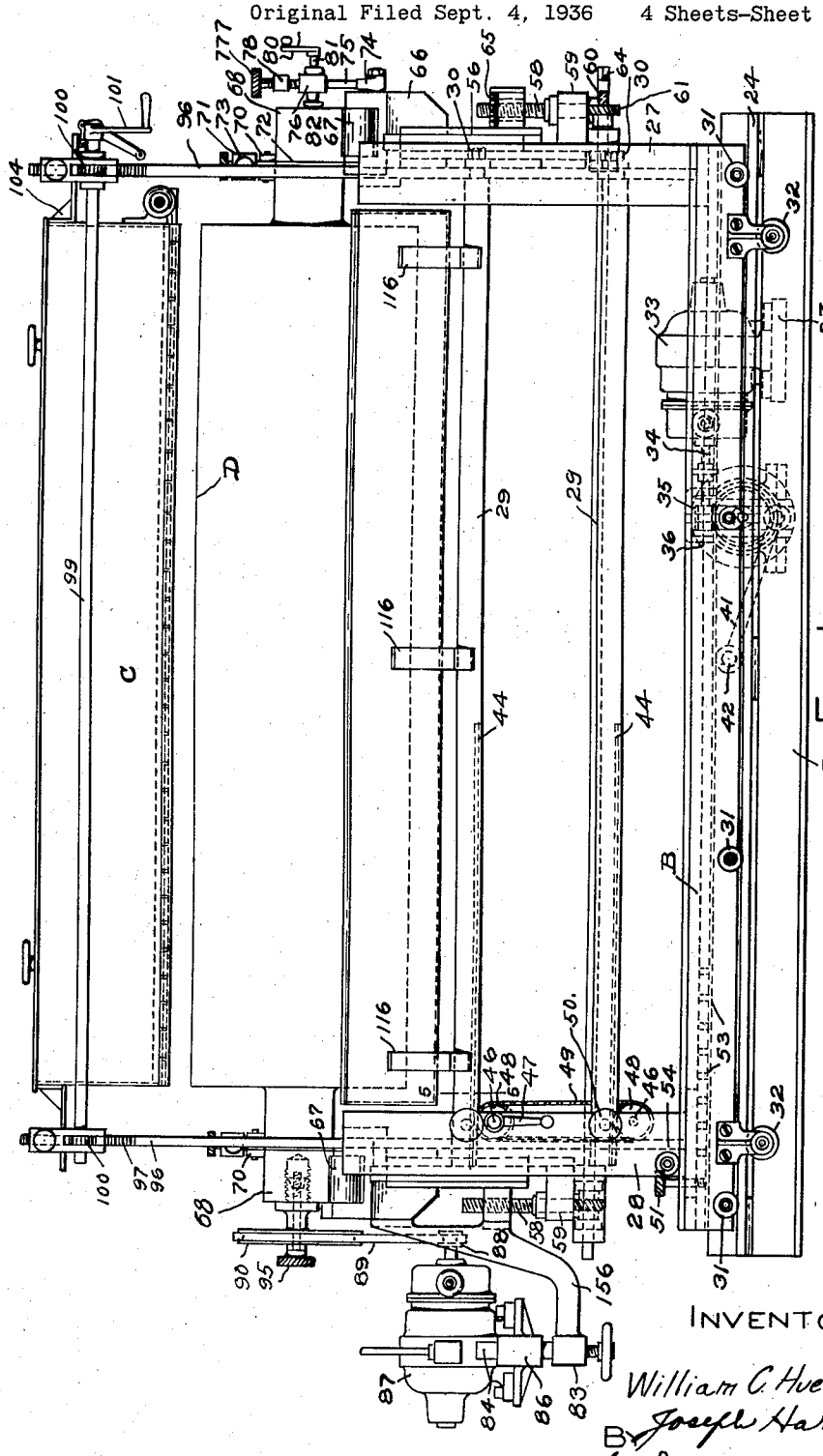


FIG. 1.

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COATING MACHINE

Original Filed Sept. 4, 1936 4 Sheets-Sheet 2

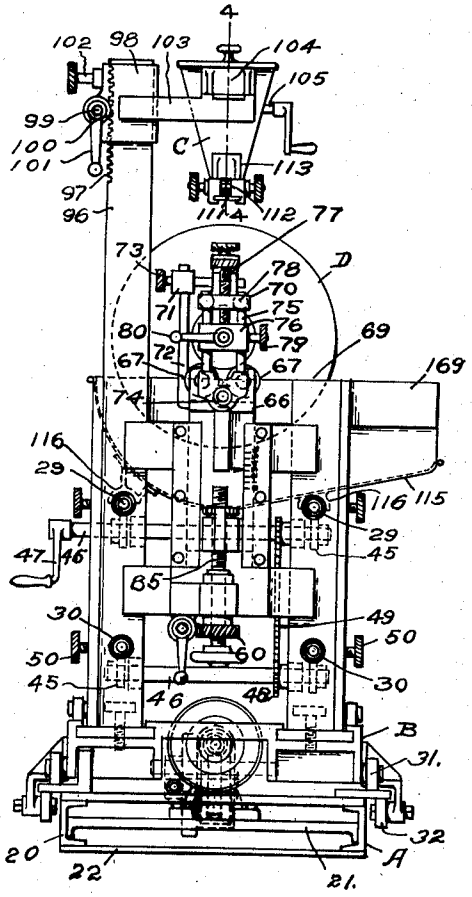


Fig. 2.

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COATING MACHINE

Original Filed Sept. 4, 1936 4 Sheets-Sheet 3

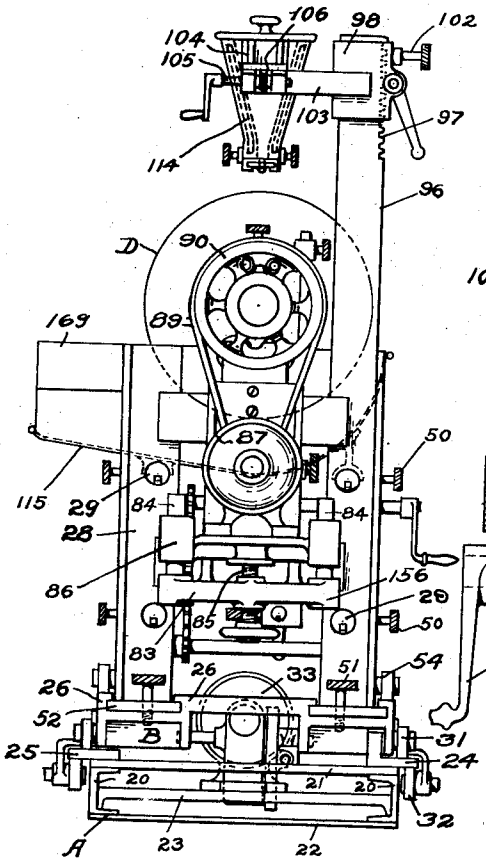


FIG. 3.

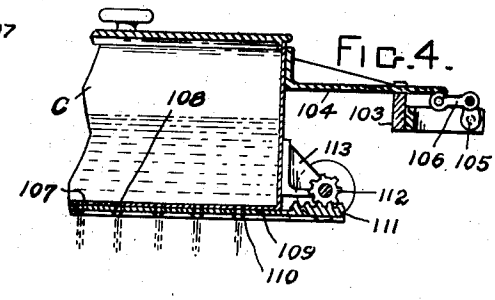


FIG. 4.

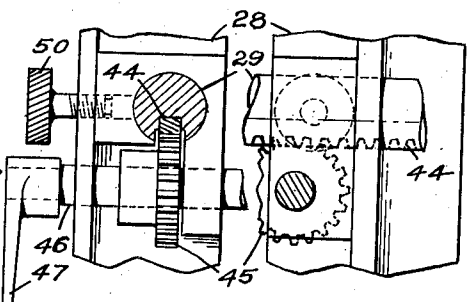


FIG. 5.

FIG. 6.

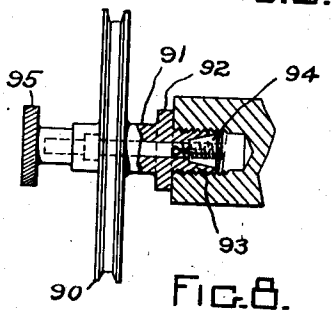


FIG. 8.

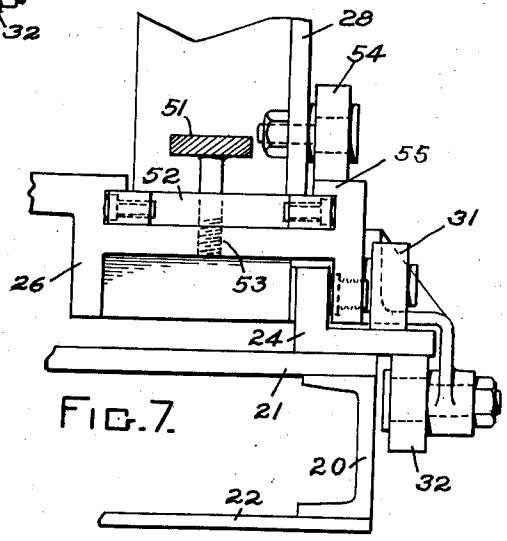


FIG. 7.

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COATING MACHINE

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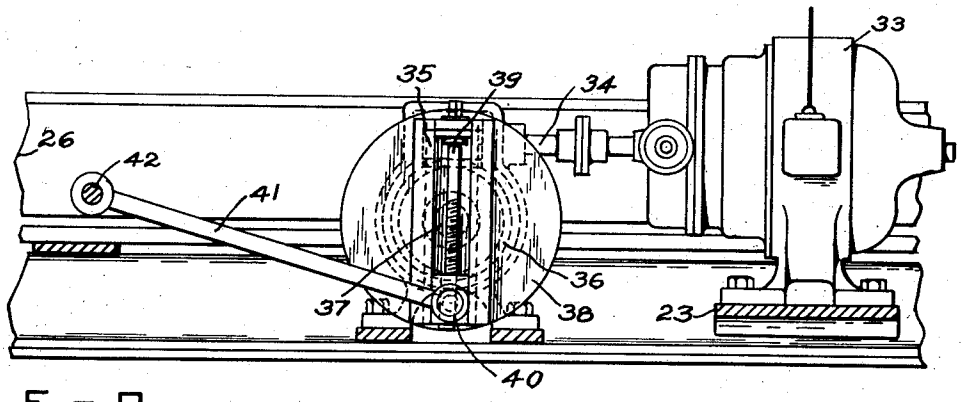


FIG. 9.

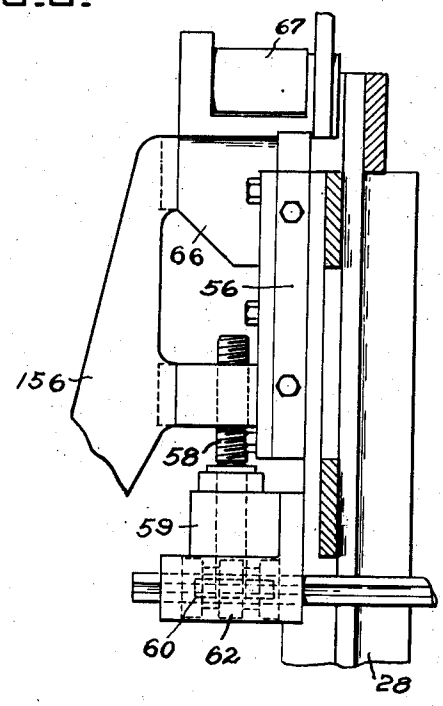


FIG. 10.

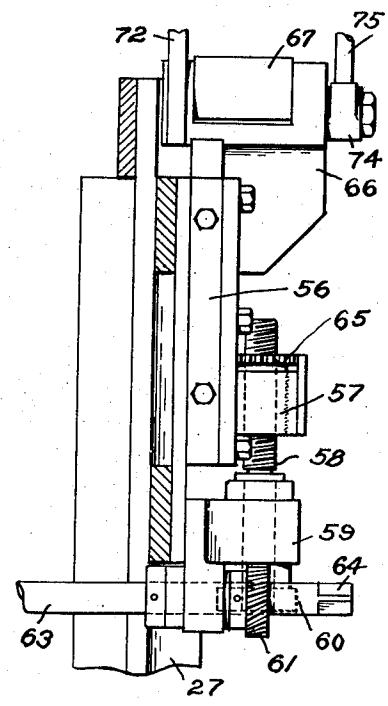


FIG. 11.

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UNITED STATES PATENT OFFICE

2,133,516

COATING MACHINE

William C. Huebner, New York, N. Y.

Application September 4, 1936, Serial No. 99,447
Renewed August 13, 1938

12 Claims. (Cl. 91—18)

This invention relates to improvements in coating machines and, more particularly, machines for coating cylinders with light sensitive coatings or emulsions.

One object of the invention is to provide a machine adapted for applying liquid coatings rapidly and uniformly to the surfaces of cylinders and more especially, light sensitive coatings to the printing surfaces of rotagravure cylinders and the like.

Another object of the invention is to provide a machine of the type indicated in the preceding paragraph wherein, during the application of the coating to the cylinder surface, the cylinder has imparted thereto a rotary motion and, after sufficient application of the coating material, the cylinder has then imparted to it a rapid reciprocatory motion in addition to the rotary motion so as to insure uniform spreading of the coating material over the entire surface.

A further object of the invention is to provide a cylinder coating machine of the character indicated, so constructed and arranged that it is readily adjustable to work on cylinders of different diameters and different lengths.

A specific object of the invention is to provide a cylinder coating machine of the type indicated, wherein the usual heavy rollers, ordinarily difficult to handle on account of their weight and necessity of preventing injury to the working or printing surfaces thereof, may nevertheless be easily rolled into and out of position in the machine on the usual trunnions of the cylinders without the necessity of using any lifting tackle or other like means.

Other objects of the invention will more clearly appear from the description and claims hereinafter following.

In the drawings forming a part of this specification, Figure 1 is a front elevational view of a machine showing the improvements incorporated therein. Figure 2 is an end elevational view of the machine shown in Figure 1, the end there shown being the right hand end of the machine as it appears in Figure 1. Figure 3 is an elevational end view showing the opposite end of the machine. Figure 4 is an enlarged detail sectional view of the coating supply tank and corresponds substantially to the line 4—4 of Figure 2. Figure 5 is an enlarged vertical sectional view corresponding substantially to the line 5—5 of Figure 1. Figure 6 is a view of the same detail shown in Figure 5 but taken at right angles thereto. Figure 7 is an enlarged elevational view of portions of the base and carriage of the machine showing the manner of mounting the carriage on the base. Figure 8 is a detail view partly in elevation and partly in section illustrating one means for effecting rotation of the cylinder. Figure 9 is an enlarged detail view partly in elevation and partly in section lengthwise of the machine and illustrating more particularly the means for imparting reciprocatory motion to the carriage. And Figures 10 and 11 are complemental vertical sectional views and partly in elevation, upon an enlarged scale, illustrating more particularly the means for effecting vertical adjustment of the cylinder trunnion supporting means.

In said drawings, the machine comprises, broadly, a base A; a horizontally reciprocatory carriage B; a tank or container C for the coating solution or other liquid material to be applied to the cylinder, such a cylinder being indicated by the reference D. The several drives and adjusting means are described hereinafter.

In carrying out the invention, a suitable heavy base A is provided, adapted to be secured to flooring in any suitable manner, said base A being preferably built up of channels 20—20 and plates 21 and 22 with an intermediate bracing channel 23, all rigidly secured together as will be understood. Mounted on the base along each side thereof are tracks 24 and 25, the former being of angular form as best shown in Figure 7 and the latter merely a heavy thick plate, both tracks projecting laterally outwardly beyond the base, as shown in Figures 3 and 7.

The carriage B preferably comprises a bottom casting 26 extending the full length of the carriage; a heavy standard 27 at the right hand end of the machine, as viewed in Figure 1, rigidly and fixedly associated with the bottom casting 26; a left hand heavy standard 28 slidably adjustable on the bottom casting 26; and combined bracing and heavy guide rods 29—29, four in number as shown, and disposed in vertically spaced horizontal pairs and having their right hand ends fixedly secured to the right hand standard 27 by suitable means such as the nuts 30—30. The carriage B carries other parts hereinafter described.

To provide for the desired reciprocatory movements of the carriage B, the latter is supported on the tracks 24 and 25 by a plurality of anti-friction rollers 31—31. To prevent upward tilting or displacement of the carriage B, additional anti-friction rollers 32—32 on each side of the machine are provided, the same being carried by brackets secured to the base casting 26 and the

rollers 32 disposed beneath the overhanging portions of the tracks 24—25 as best shown in Figures 1, 3 and 7.

Reciprocatory movement is imparted to the carriage B by any suitable means, one desirable embodiment being best illustrated in Figures 1 and 9. As there shown, a motor 33 is suitably mounted on the cross-plate or brace 23, said motor having extending therefrom lengthwise of the machine, a shaft 34 carrying a worm 35 which meshes with a worm gear 36 carried by a transversely extending shaft 37 suitably journaled in journal bearings supported by the base A. Said shaft 37, at one end, carries a disk 38 in which is diametrically adjustably mounted, as by the adjusting screw 39, a crank pin cross-head 40 to which is connected a pitman 41 having its other end pivotally connected at 42 to the bottom casting 26 of the carriage. With this construction, it is evident that upon energizing the motor 33, a rapid reciprocatory movement is imparted to the carriage B, the length of the stroke or extent of reciprocatory movement being readily adjustable by adjusting the cross-head 40 relative to the axis of the shaft 37, as will be understood.

As hereinbefore indicated, the machine is adapted for the coating of cylinders D of varying lengths, such as occur in many printing establishments, and more particularly rotagravure plants. For this purpose, the left hand standard 28 of the carriage, referring to Figure 1, is made adjustable toward and from the right hand standard 27, preferably by the following means. All of the heavy rods 29 are slidable through or with reference to the standard 28 and, to effect the adjustments of the standard 28 back and forth, all of said rods 29 are preferably provided on their under sides for a portion of their length from their left hand ends, with racks 44, as best illustrated in Figures 5 and 6. Cooperable with each of said racks is a pinion 45, the pinions 45 being arranged in horizontal pairs and carried by transversely extending shafts 46—46. One of said shafts, preferably the upper one, has its end extended and provided with a manually operable crank arm 47. To insure simultaneous and equal rotation of all of the pinions 45, the shafts 46 have secured thereto sprocket gears 48 with which cooperates a sprocket chain 49 so that, upon rotation of the crank handle 47, the standard 28 will be adjusted either inwardly or outwardly simultaneously and uniformly at four spaced points. When the standard has been adjusted to the desired position, it may be securely locked in such position by clamping screws 50—50, each so positioned that it will engage a rod 29, as shown in Figures 3 and 5. Additional means may be employed to retain the standard 28 in adjusted position relative to the bottom casting 26, such additional means comprising dowel screws 51 passing through bottom flanges 52 of the standard 28 and adapted to engage selectively in any one of a number of holes 53 provided in the bottom casting 26. To lessen the friction incident to the adjustment of the standard 28, the latter may be provided with anti-friction rolls 54 at each side, the same running on supporting tracks 55 formed integrally with the bottom casting 26, as best shown in Figures 3 and 7.

Each of the standards 27 and 28 of the carriage B is provided on its outer side with a vertically adjustable cross-head carrying the means for supporting the trunnions of the cylinder D. Said cross-heads are indicated at 56—56 (see Figures 1, 2, 3, 10 and 11) and each carries a nut 57 with which engages a vertically disposed adjusting screw 58. The screws 58 in turn are swiveled in brackets 59 rigidly secured to the standards 27 and 28 and at their lower ends, the screws 58 carry helical gears 60 with which cooperate helical gears 61 and 62 in turn mounted upon a common longitudinally extending shaft 63. The gear 61, shown in Figure 11, is rigidly secured to the shaft 63, whereas the other gear 62 is suitably mounted within a housing and splined to the shaft so as to be adjustable lengthwise thereof while always rotating in unison with the shaft 63. One end of the shaft 63 may be extended and suitably formed as indicated at 64 for reception of a crank so that, upon rotation of the shaft 63, both cross-heads at the ends of the machine will be raised or lowered simultaneously and uniformly. When the proper position of the cross-heads has been obtained, the parts may be securely locked by any suitable means such as the lock washer 65 on the right hand adjusting screw 58, as shown in Figure 4.

At their upper ends, each of the cross-heads 56 is provided with a journal bearing bracket 66 in which are rotatably mounted two relatively heavy anti-friction rollers 67—67 with their axes extending lengthwise of the machine and on the same level so as to thereby provide two rolling points of support for the trunnions 68 of the cylinder D.

As will be understood by those skilled in the art, printing cylinders of the character to which the present invention relates, are very heavy and require much care in the handling thereof in order to prevent injury to the active or printing surfaces of the cylinders. To facilitate insertion of such heavy cylinders into the machine of the present invention and also to facilitate their removal, each of the standards 27 and 28 of the carriage is provided with a substantially horizontal supporting ledge 69, said ledges being extended to the rear side of the machine, as indicated at 169. The cylinders, when brought to the machine, are disposed with their trunnions 68 resting upon the ledge extensions 169 so that the cylinder may then be rolled into operative position along the ledges 69. During this operation, the trunnion supporting rollers 67 will, of course, be lowered below the level of the ledges 69 and, when the cylinder has reached its proper position, the trunnion supporting rollers will then be elevated so as to engage the trunnions and thus lift the same off the ledges and thereby place the cylinders in condition for rotation as hereinafter described.

To retain the cylinder always in proper engagement with the trunnion supporting rollers 67 while the cylinder is being rotated, additional anti-friction rollers 70 may be employed at each end of the machine, each pair or rollers 70 being carried by a suitable bracket including a block 71 which is vertically adjustable on a guide rod 72 secured to the cross-head 66. The block is adapted to be held in adjusted position by a set screw 73.

To prevent or limit endwise play of the cylinder when in the machine, any suitable means may be provided for that purpose, one such arrangement being best illustrated in Figures 1 and 2, the same comprising a bracket 74 suitably secured to the upper end of the cross-head 66 and from which bracket extend upwardly a pair of rods 75 on which is vertically adjustable a block 76 as by means of the vertical adjust-

ing screw 77 threaded in a cross bar 78 secured to the tops of the rods 75. The block 76 is retained in adjusted position by a set screw 79. Threaded in the block 76 and adjustable axially of the cylinder by means of a crank arm 80 is a screw 81 carrying at its inner end a center point 82 adapted to engage the usual counterbore in the cylinder trunnion.

To impart rotary motion to the cylinder D during the coating operation, the following means are preferably employed. The bracket 56 carried by the left hand standard 28, as viewed in Figure 1, is provided with downward and outward extensions 156 connected at their outer ends by a cross bar 83 (see Figure 3) from the ends of which extend upwardly a pair of guide rods 84. Vertically adjustable on the guide rods 84 by the adjusting screw 85 journaled in the cross bar 83, is a cross-head 86 which carries a motor 87. The shaft extended from the latter toward the machine, is provided with a V pulley 88 over which runs a V-belt 89, the latter also taking over a larger pulley 90 having an integrally formed hub 91. Referring to Figures 1 and 8, said hub 91 is provided at its inner end with a collar 92 and an expandible mandrel 93 adapted to be threaded into the usual threaded opening of the other trunnion of the cylinder, said mandrel being expanded by a wedge 94 actuated from the outer side of the pulley by a knurled adjusting screw 95. With the construction shown and described, it is evident that a positive drive is effected between the motor 87 and the cylinder D and, also, that by adjusting the motor relative to the bracket arms 156, the belt drive may be tensioned to the desired degree with cylinders having different diameter trunnions.

To support the tank or container C, the standards 27 and 28 are each provided with vertical extension posts 96—96 formed at their upper ends with racks 97. Vertically adjustable on and guided by the posts 96 are blocks 98, the same having journalled therein a longitudinally extending shaft 99 to which are secured pinions 100—100 at each end that mesh with the racks 97, the left hand pinion 100 being splined with the shaft 99 to allow of the endwise adjustment of the left hand standard 28, as will be understood. The shaft 99 is rotated by means of a crank handle 101 to thereby raise and lower the blocks 98 relative to the cylinder and said blocks are then held in adjusted position by set screws 102.

The blocks 98 are provided with horizontally extending arms 103 projecting over the cylinder, the same providing a slidable support for the tank C, which, at its ends, is provided with outstanding brackets 104. It is desirable to impart to the tank C a relatively short and slow reciprocatory motion when the solution or coating material is being deposited on the cylinder and for this purpose, any suitable means may be provided. As best shown in Figures 1 and 3, a crank handle operated shaft 105 is journaled in suitable brackets carried by the arm 103, said shaft 105 having a crank arm and pitman connection 106 with the adjacent bracket 104 of the tank.

The tank C is of special construction, preferably as follows. The tank will be made of substantially the same length as the cylinder with which it is to be used, it being understood that different sized tanks will be employed corresponding to different length cylinders which may be coated. The tank is of generally tapered form, as viewed in end elevation and shown in Figure 3 and terminates with a flat bottom 107 extending the full length thereof. Said bottom is provided with a plurality of discharge openings 108 uniformly and relatively closely spaced lengthwise of the tank, as best shown in Figure 4. Slidably mounted on the underside of the bottom 107 is a plate valve 109 also having a corresponding series of openings 110 adapted to register with the openings 108 when in the position shown in Figure 4. Obviously, when the plate valve is shifted, the same effectively serves to shut off the discharge openings 108 and hence stop the flow of coating material onto the cylinder. To adjust the plate valve 109, the same may be provided with a rack extension 111 with which cooperates a pinion 112 carried by a shaft journaled in a suitable bracket 113 mounted on the end wall of the tank.

In applying light sensitive coatings or emulsions to printing cylinders, it is highly desirable that the liquid be maintained at a proper temperature. For this purpose, the tank C is provided with an inner container indicated best by dotted lines 114 in Figure 3, so as to provide spaces between it and the outside walls of the container and within which space may be located any suitable heating means such as electric heating coils or steam coils, the details of which it is deemed unnecessary to illustrate.

To catch any of the coating material or other liquid which may drip from the cylinder, a suitable drip pan 115 is disposed therebelow, the same being removably supported on the upper pair of tie rods 29 as by the foot castings 116 disposed at intervals along the drip pan. Different size drip pans will be employed with different size cylinders.

In using the invention, after the cylinder is in place on the trunnion supporting rollers, the following procedure is preferably employed. The plate valve 109 is adjusted so as to permit the coating material to drip through the discharge openings 108, it being evident that there will be a relatively large number of fine streams of the material which drips down onto the cylinder. During the application of the coating material, the cylinder will be rotated by starting the motor 87. Also a slow reciprocatory motion will be imparted manually to the tank C by the crank operated shaft 105, the extent of the throw corresponding to the spacings of the discharge openings 108. In this manner, the coating material is applied to the cylindrical surface simultaneously at a large number of points each in a small amount and the same will spread lengthwise of the cylindrical surface due to the reciprocatory movement of the tank, thus minimizing tendency of the material to build up in ridges, either true annular or helical. When the required amount has been disposed over the surface of the cylinder, the supply is shut off by shifting the plate valve 109 and then, with the cylinder D still being rotated, the motor 33 is started up, thus combining with the rotary motion of the cylinder a rapid reciprocatory motion to further insure uniform and even distribution of the material over the surface free from ridges or lumps, the action being continued until the material is sufficiently set.

With the construction shown and described, it is apparent that the machine is adapted for coating or otherwise feeding the surfaces of cylinders with liquid solutions in a rapid and

efficient manner. Further, the machine is readily adaptable for use with cylinders of varying diameters and varying lengths, all adjustments being easily made in the manner hereinbefore described. It will further be evident that none of the parts of the machine need be removed when entering the cylinder or when removing it from the coating machine.

Although there has herein been shown and described what is now considered the preferred manner of carrying out the invention, the same is merely illustrative and not by way of limitation. All changes and modifications are contemplated that come within the scope of the claims appended hereto.

What is claimed is:

1. In a machine of the character described, the combination with a base; of a carriage mounted on the base, said carriage including end standards; trunnion supports on said standards; means for adjusting the trunnion supports relative to their respective standards; means on said carriage for imparting rotation to a cylinder when mounted on said trunnion supports; means for adjusting said standards relatively toward and from each other and thereby the effective distance between the trunnion supports; means for depositing a liquid on a cylinder while mounted on said carriage; and means for imparting reciprocatory movement to the carriage relative to the base.

2. In a coating machine, the combination with a base; of spaced standards each having a supporting ledge; trunnion supporting means mounted on each standard adjacent the ledge thereof; means for adjusting said trunnion supporting means to positions above and below said ledges whereby a cylinder having trunnions at its ends may be rolled on said ledges to and from operative position with respect to the trunnion supporting means; and means for imparting rotation to a cylinder when mounted on the trunnion supporting means.

3. In a coating machine, the combination with a base; of spaced standards each having a supporting ledge; trunnion supporting means mounted on each standard adjacent the ledge thereof; means for adjusting said trunnion supporting means to positions above and below said ledges whereby a cylinder having trunnions at its ends may be rolled on said ledges to and from operative position with respect to the trunnion supporting means; means for imparting rotation to a cylinder when mounted on the trunnion supporting means; and means for adjusting said standards toward and from each other to thereby accommodate cylinders of different length.

4. In a coating machine, the combination with a base; of spaced standards each having a supporting ledge; trunnion supporting means mounted on each standard adjacent the ledge thereof; means for adjusting said trunnion supporting means to positions above and below said ledges whereby a cylinder having trunnions at its ends may be rolled on said ledges to and from operative position with respect to the trunnion supporting means; means for imparting rotation to a cylinder when mounted on the trunnion supporting means; means for adjusting said standards toward and from each other to thereby accommodate cylinders of different length; and means for effecting simultaneous adjustment of the trunnion supporting means.

5. In a machine of the character described, the combination with a base; of a carriage having a bottom member and end standards, each of the latter having an upper horizontal supporting ledge, and connecting elements extending between the standards, one of the standards being adjustable with respect to the bottom member and connecting elements; a cross-head vertically adjustable on each standard; means for simultaneously adjusting the cross-heads relative to the standards; trunnion supporting rollers on each cross-head, the effective points of support of said rollers being adjustable to positions above and below the supporting ledges; means for rotating a cylinder when supported on said rollers; and means for depositing a liquid on the cylinder surface.

6. In a machine of the character described, the combination with a base; of a carriage; means on the carriage for rotatably supporting a cylinder to be coated; means for depositing a liquid solution on a cylinder while so supported; means for rotating the cylinder; and means for imparting reciprocatory movement to the carriage relative to the base, said means being adjustable to vary the extent of reciprocatory movement.

7. In a machine of the character described, the combination with a carriage including end standards; means for adjusting the standards relative to each other; trunnion supporting means mounted on each standard; a motor mounted on one of the standards of said carriage; driving connections from the motor connectable to a trunnion of a cylinder when supported on the trunnion supports; means for adjusting the position of the motor relative to the trunnion supports mounted on the same standard to thereby adapt the motor drive to cylinders of different diameters; and means for depositing liquid on a cylinder.

8. In a machine of the character described, the combination with a base; of a carriage mounted on the base, said carriage including a bottom member and end standards, the latter being relatively adjustable toward and from each other; a cross-head vertically adjustably mounted on each standard; means for simultaneously adjusting said cross-heads; a motor supported from one of the cross-heads; means for adjusting the motor relative to the cross-head on which mounted; means for depositing liquid; and means for reciprocating the carriage relative to the base.

9. In a machine of the character described, the combination with a carriage including standards; of means for adjusting said standards toward and from each other; means carried by the standards for rotatably supporting a cylinder having trunnions at its ends; means on the carriage for rotating a cylinder when mounted on said supports; a liquid supply tank mounted on the carriage above the cylinder; and means for adjusting the tank toward and from the cylinder.

10. In a machine of the character described, the combination with a carriage including standards; of means for adjusting said standards toward and from each other; means carried by the standards for rotatably supporting a cylinder having trunnions at its ends; means on the carriage for rotating a cylinder when mounted on said supports; a liquid supply tank mounted on the carriage above the cylinder; means for adjusting the tank toward and from the cylinder; means for reciprocating the tank lengthwise

relative to the cylinder; a base; and means for reciprocating the carriage on the base.

11. In a machine of the character described, the combination with a base; of a carriage comprising a bottom member and end standards; means for adjusting the standards relatively toward and from each other; means on said standards for rotatably supporting a cylinder to be coated; means for depositing a coating material on the cylinder while so supported; means for rotating the cylinder; and means for imparting reciprocatory movement to the entire carriage relative to the base.

12. In a machine of the character described, the combination with a carriage including end standards; trunnion supporting means mounted on each standard; a motor for rotating a cylinder while supported on said trunnions, said motor being mounted on one of the carriage standards; power transmitting means adapted to provide a connection from said motor to a trunnion of a cylinder while supported on the trunnion supports; means for adjusting the position of the motor relative to those trunnion supports which are mounted on the same standard to thereby adapt the motor for rotating cylinders of different diameters; and means for depositing coating material on a cylinder while supported on said trunnion supporting means.

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