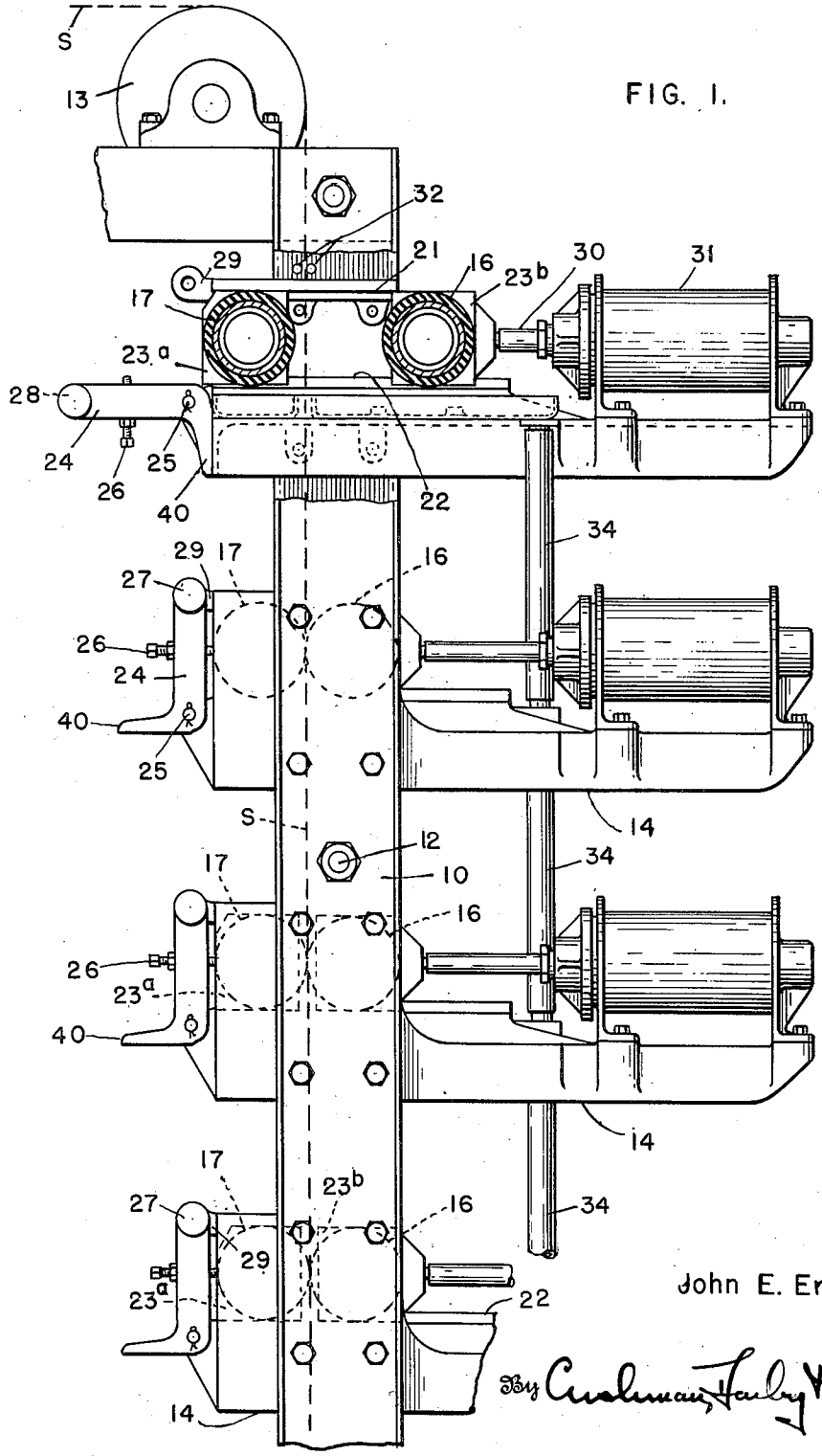
March 13, 1951 J. E. ERHARDT, JR 2,545,025

TREATING ROLL MOUNTING AND ROLL DRIVE

Filed Nov. 16, 1945 4 Sheets-Sheet 1

FIG. 1.



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4 Sheets-Sheet 2

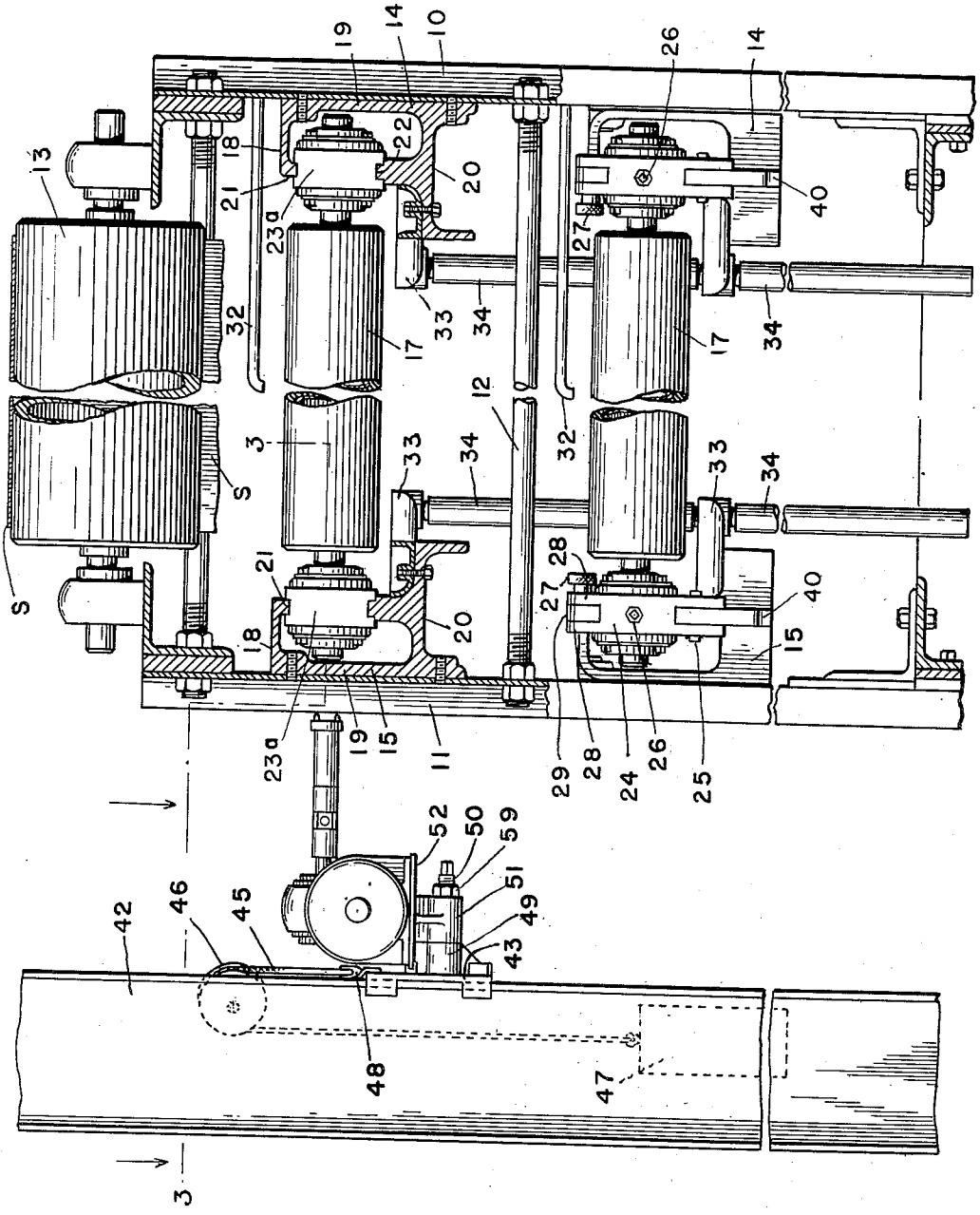


FIG. 2.

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TREATING ROLL MOUNTING AND ROLL DRIVE

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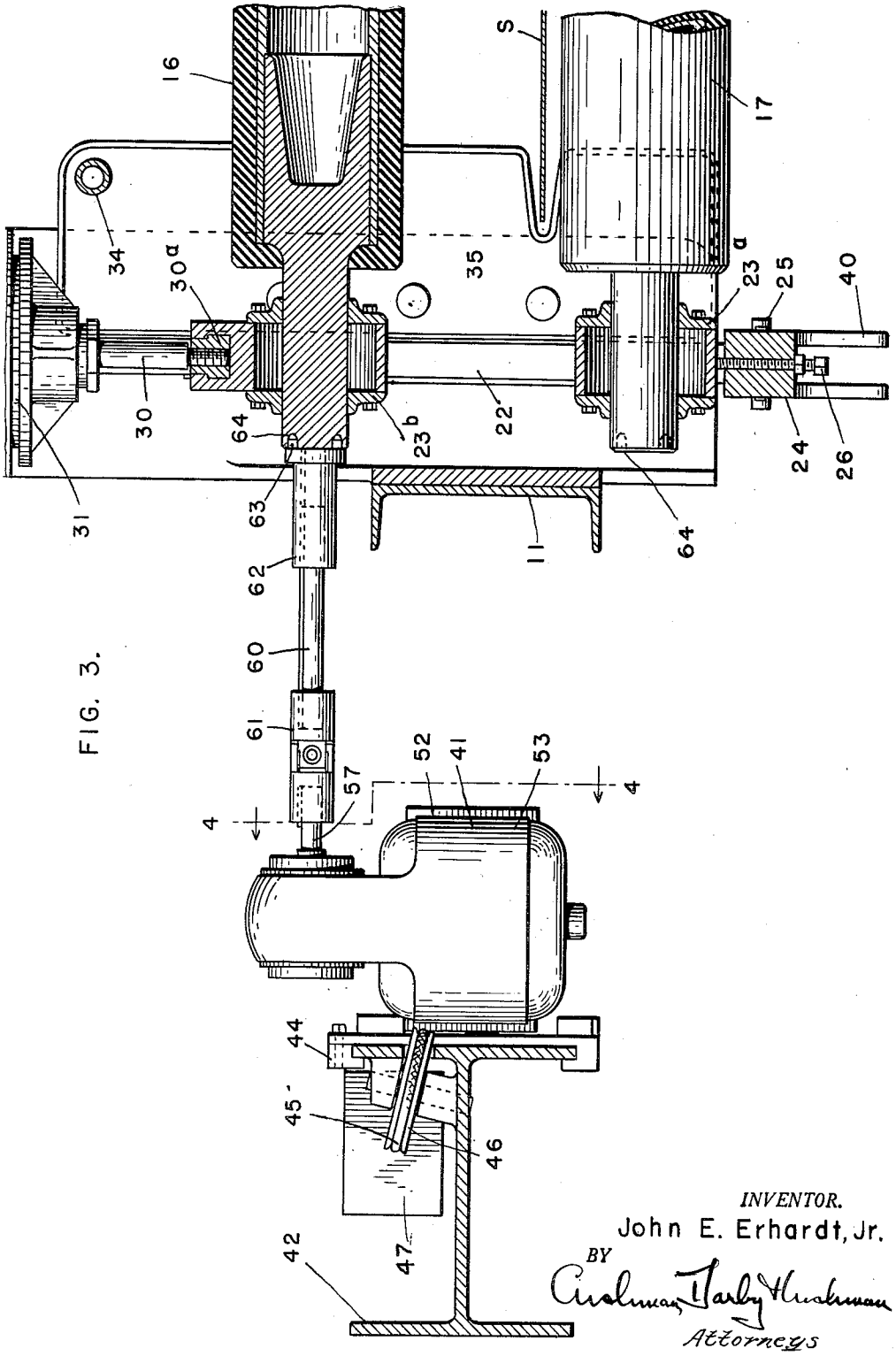


FIG. 3.

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TREATING ROLL MOUNTING AND ROLL DRIVE

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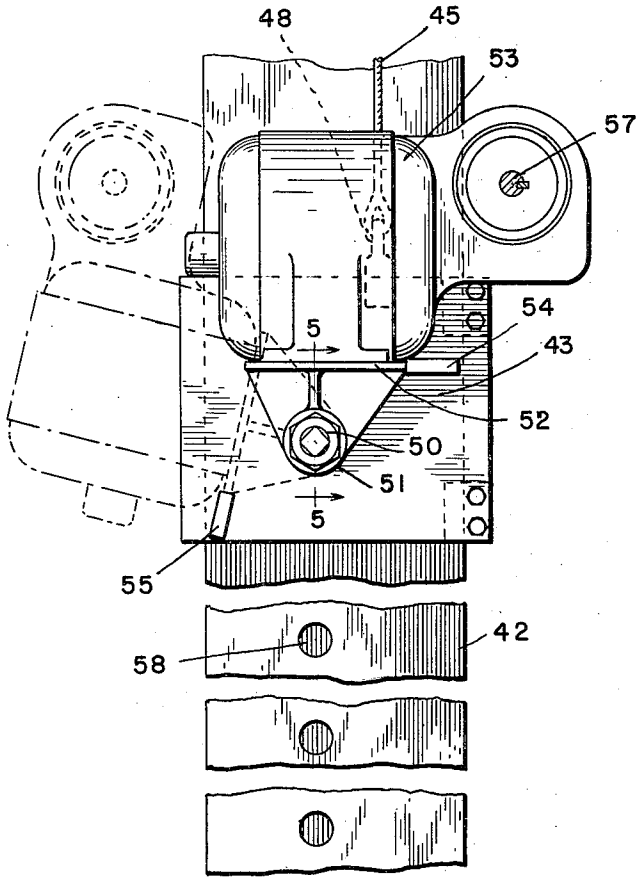


FIG. 4.

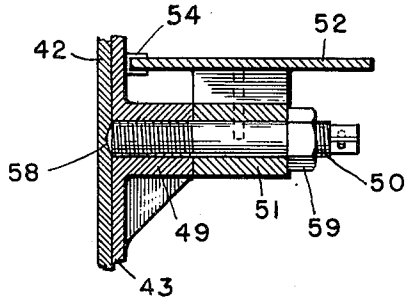


FIG. 5.

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TREATING ROLL MOUNTING AND ROLL DRIVE

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Application November 16, 1945, Serial No. 629,029

10 Claims. (Cl. 51—236)

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The present invention relates to treating roll mountings and roll drive for use in strip treating apparatus.

Certain treatments given metal strip prior to coating the strip for use in containers, caps or the like, necessitate moving the strip through roll couples which apply a treating liquid to the strip. Such treating rolls readily become so coated with a hard, dried layer of the liquid that it is necessary to frequently clean them to maintain them in proper condition, as well as to avoid marring the strip. More particularly, if the process requires the use of resilient rolls, the building up of a hard layer of material on the rolls renders them non-resilient and will result in scratching or otherwise marring the strip. Prior systems of mounting the rolls have not permitted them to be readily removed without stopping movement of the strip. If the strip is also being moved through chemical baths, heating chambers or other elements in which it cannot be stopped without being injured by over-treatment, stoppage to remove rolls is highly undesirable. For that reason, efforts have been made to clean the rolls while they are in contact with the strip, as by holding abrasive cloth against them to remove the hardened coating. However, this gradual removal of the coating from point to point along the roll, together with the effect of such abrasive as is carried by the roll into contact with the strip, simply mars the surface of the strip; for example, by applying streaks to its surface.

An object of the invention is to provide mountings for treating rolls whereby the rolls of a couple can be readily removed or withdrawn from contact with a moving strip.

The invention includes the provision of extra roll couples mounted in readiness for movement into contact with the strip when it becomes necessary to withdraw a couple. By this arrangement, the necessary number of couples can be maintained in contact with the strip at all times.

Another object of the invention is to provide a drive which can be readily connected to the rolls when they are withdrawn from the strip and whereby they can be cleaned by abrasives.

A further object is to provide means which will enable the rolls to be held under desired pressure against the strip and to insure return of the rolls to proper position after they have been withdrawn from contact with the strip.

Further objects and advantages of the invention will be apparent from the following specification and accompanying drawings, wherein

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Figure 1 is a side elevation of the roll mounting of the present invention, an upper part of the figure being broken away to show such portion in vertical section.

Figure 2 is an elevation of the apparatus, the view showing the Figure 1 structure as viewed toward the left of the latter figure.

Figure 3 shows the left-hand portion of the Figure 2 structure on the line 3—3 of Figure 2.

Figure 4 is a vertical section on the line 4—4 of Figure 3, and

Figure 5 is a detail section on the line 5—5 of Figure 4.

As best shown in Figure 2, the apparatus includes spaced vertical beams 10 and 11 braced intermediate their height by rods 12. At their upper ends, the beams support the bearings for a large roll 13 extending between the beams. The strip S to be treated moves from the top-left in Figure 1 over roll 13 and thence downwardly between the beams 10 and 11. The strip is moved by suitable pinch rolls, not shown. At points spaced along its height, the beam 10 has brackets or roll mountings 14 secured thereto and, at correspondingly spaced points, the beam 11 carries brackets or roll mountings 15. The brackets 14 carried by beam 10 cooperate with the horizontally aligned brackets 15 carried by beam 11 to support the bearings of a vertical series of opposed treating rolls 16 and 17 provided with a resilient surface material.

As best shown in Figure 2, the brackets 14 and 15 are each provided with top walls 18 projecting toward the center of the apparatus, side walls 19 secured to the beams, and bottom walls 20 which also extend toward the center of the apparatus. Each top wall includes a depending slideway 21 while each bottom wall includes an upwardly projecting slideway 22. The treating rolls 16 include stub-shafts at each end which are supported in and extend through bearing housings 23b. Each roll 17 is similarly mounted in bearing housings 23a, a roll 16 and a roll 17 forming a roll couple. The upper and lower surfaces of the bearing housings are grooved to fit the slideways 21 and 22. Each upper slideway 21 has such length as to accommodate and engage the grooves of both associated bearing housings 23a and 23b when the two rolls are positioned together as indicated by the three lower roll couples of Figure 1. However, the lower slideways are sufficiently long that when the rolls 16 and 17 are moved apart to a position such as shown at the top of Figure 1 the bearing housing grooves will still be in engagement with that slideway.

At its left hand end, as viewed in Figure 1, the bottom wall 20 of each bracket 14 and 15 has a stop arm 24 pivoted thereto as indicated at 25. Each stop arm has a set screw 26 threaded therethrough. Each stop arm is locked in vertical position by pins 27 which extend through two spaced and apertured lugs 28 at the free end of the arm and which straddle a lug 29 carried by the top wall 18 of each bracket. When a stop arm is in this vertical position, the left hand roller 17 (Figure 1) is fixed against movement away from the strip S, the set screw 26 serving to limit the movement of the bearing housing and roller away from the strip. A lock nut is carried by each set screw 26 to hold it in adjusted position.

Each right hand roller 16 (Figure 1) has its bearing housing 23b connected to pistons 30 operable in cylinders 31 secured to the lower walls 20 of the brackets 15. As shown in Figure 3, each piston includes a T-head 30a which engages a vertically extending T-socket in the housing. When fluid under pressure of two hundred pounds, for example, is supplied to a cylinder 31 to move the pistons and corresponding roller 16 to the left in Figure 1, the roller 16 will bear upon the strip S and will exert sufficient force, with the roller 17, to apply treating material to either or both sides of the strip. As has been explained above, the position of each roller 17 will be maintained by the set screws 26 when its stop arms 24 are in vertical position and locked by the pins 27.

The treating fluid is supplied to each pair of rolls by liquid supply pipes 32, two such pipes being positioned above each pair of rolls so that one pipe will deliver liquid to the trough formed between a roll 16 and the strip and the other pipe will deliver liquid to the trough between the other side of the strip and the roll 17. If it is only desired to treat one surface of the strip, the pipe 32 on one side will be omitted. The ends of the pipes 32 are preferably located midway between the ends of the rolls so that surplus liquid may flow toward the ends of the rolls and fall into a tray 33 secured to the bottom wall 20 of each bracket 14 and 15. Each tray 33 has an overflow pipe 34 extending downwardly therefrom to the next lower tray 33 so that the liquid is eventually carried downwardly to a treating bath, not shown, through which the strip moves after passing through the series of roll couples. As best shown in Figure 3, the inner side of each tray 33 is notched as indicated at 35, this notch providing clearance for the edge of the strip. The notch as well as the edges of the tray include upstanding side walls.

With the rolls under suitable pressure, the treating liquid will be applied to the surface of the moving strip to give it the desired characteristics. For example, the treating liquid may be a fluid which will prepare the surface of the metal for better adhesion of lacquers, paints or lithography to the same. The rolls 16 and 17 will be rotated to apply the treating liquid by reason of their tight engagement with the moving strip, the liquid being applied to the strip by the pressure exerted upon the rolls by the cylinders 31.

The treating liquid causes a coating of hard crystalline nature to build up on the treating rolls 16 and 17 and unless this coating is removed from time to time, it will mar the surface of the strip. When the rolls forming a couple become so coated as to require cleaning, the holding pressure may be released from the cylinders 31 at each end of the roll 16 of that couple and pressure supplied to the cylinders to retract the pistons 30 to thereby move the roll 16 to the position illustrated at the top of Figure 1 and also shown in Figure 3. In this position, the bearing blocks 23b at each end of roll 16 are still supported on the lower slideways 22 but they are clear of the upper slideway 21 and the roll stub-shafts are clear of the beams 10 and 11. With the roll 16 in this position, the stub-shaft at its left-hand end (Figure 2) may be connected to a driving motor for rotation as hereinafter described. Alternatively, if it is desired to entirely remove the roll and replace it, its bearing housings 23b may be disconnected from the pistons 30 by lifting the housings so as to disengage their T-shaped slots from the T-heads 30a of the pistons.

The other roll 17 of each couple may be moved out of contact with the strip S by removing the pin 27 from the stop arm 24 engaging each housing 23a so that the stop arm may drop to the horizontal position shown at the top of Figure 1. A downwardly projecting extension 40 on each stop arm will abut against the adjacent end of the associated bracket 14 or 15 to limit the downward movement of the stop arm as shown in Figure 1. The roll 17 may then be moved by hand to the position shown in Figure 3 and at the top of Figure 1 so that it will be clear of the strip S and its stub shafts will be beyond the edges of the beams 10 and 11 for engagement with the driving motor as hereinafter explained. However, its bearing housings will still engage the lower slideways 22. If it is necessary to replace the roll 17, it can be moved still further outwardly upon the stop arm 24 so that it can be lifted clear of the lugs 28.

The driving motor structure referred to above is illustrated in Figures 2 to 4 and is generally designated by the numeral 41. In order to support this structure, a vertical beam 42 is provided alongside of and spaced from the beam 11. A vertically extending plate 43 includes flanges 44 to embrace the edges of beam 42, the plate being vertically slidable on the beam. A cable 45 extends over a pulley 46 journalled near the top of beam 42, one end of the cable carrying a counter-weight 47 and the other end being secured to base plate 43 as indicated at 48. The base plate 43 includes an outwardly projecting apertured boss 49 in which a set screw 50 is threaded. A collar 51 is rotatable on set screw 50 and this collar is integral with a carrier plate 52 to which an electric motor 53 is secured. The rotation of the motor carrying plate 52 about the set screw 50 and with respect to the vertically slidable plate 43 is limited by stop blocks 54 and 55 carried by base plate 43. The motor 53 is shown in one of these positions in solid lines in Figure 4, as well as in Figures 2 and 3, wherein one edge of its base plate 52 is in contact with the stop block 54. The other position of the motor 53 is shown in dotted lines in Figure 4, wherein the opposite edge of base plate 52 is in contact with the stop block 55. When the motor is in the solid line position of Figure 4, a drive shaft 57 included in the motor structure will be in axial alignment with the roll 16, assuming that the roll 16 is in an outward position such as indicated at the top of Figure 1. When the motor is in the dotted line position of Figure 4, the shaft 57 will be in axial alignment with a roll 17, assuming that the latter is in the outward position shown at the top of Figure 1.

The motor structure 41 may be moved verti-

cally of beam 42 to align it with any of the roll couples of Figure 1, the motor being secured in the desired position by threading the set screw 50 into engagement with sockets 58 formed in beam 42 as shown in Figure 5. Tightening a lock nut 59 on the set screw will clamp the collar 51 of plate 52 in either of the two positions of the motor illustrated in Figure 4.

The motor structure 41 includes a reduction gearing to drive the shaft 57 and shaft 57 is connected to an outer shaft 60 by a universal connection 61. At its outer end, the shaft 60 has a fitting 62 slidable thereon, fitting 62 being provided with a pair of pins 63 adapted to engage recesses 64 formed in the outer ends of the stub shafts extending from the rollers 16 and 17. For example, as shown in Figure 3, the roll 16 may be rotated from the motor structure 41 with the roller free of the strip S. By driving the roll 16 and moving a sheet of abrasive cloth along the surface of the roll, any crystalline coating may be removed from the roll, the removed coating and abrasive simply falling down into the treatment tank where they cannot be forced against the strip. The electric motor may be supplied with current from flexible cable trained over a second pulley, not shown, mounted on the beam 42.

By swinging the motor structure 41 to the dotted line position, its shaft 57 will be in alignment with the other roll 17 of the same couple. That is, in the dotted line position of Figure 4, shaft 57 will be in the same horizonal plane it occupies when in full line position.

The weight of the rolls 16 and 17 and their roll mountings, together with the frictional engagement of the mountings with the lower slideways, will prevent the rolls from moving with respect to the slideways when they are in the non-strip engaging position shown at the top of Figure 1 and are being rotated by motor 53. In addition, if the abrasive cloth is pressed downwardly on the rolls, they will be held even more firmly against movement with respect to the slideways.

A sufficient number of treating roll pairs are provided in the Figure 1 structure to enable at least one pair to be kept out of contact with the strip and yet have enough other pairs available for contact with the strip. By this system, it will not be necessary to stop the strip to enable any pair to be cleaned.

Subject matter disclosed but not claimed herein may be claimed in my divisional application for treating roll mountings and roll drives, Serial No. 95,744, filed May 25, 1949.

The terminology used in the specification is for the purpose of description and not of limitation, the scope of the invention being defined in the claims.

I claim:

1. In combination, a series of vertically spaced roll couples, a series of vertically spaced mountings for the respective roll couples, a vertically extending support at one end of said series, and driving means for said rolls vertically movable on said support for selective engagement with the rolls of said couples.

2. In combination, a series of vertically spaced roll couples, a series of vertically spaced mountings for the respective roll couples, a vertically extending support at one end of said series, driving means for said rolls vertically movable on said support for selective engagement with the rolls of said couples, said driving means being

selectively and horizontally movable to alternate positions with respect to said support to be connected to either roll of a couple.

3. The combination defined in claim 2 including means to support each roll of a couple in either of two positions, one of which positions is so related to one of the alternate positions of said driving means that the roll and driving means will then be in axial coincidence.

4. In combination, a series of vertically spaced roll couples, a series of vertically spaced mountings for the respective roll couples, a vertically extending support at one end of said series, driving means for said rolls vertically movable on said support for selective engagement with the rolls of said couples, said driving means being selectively and horizontally movable to alternate positions with respect to said support to be connected to either roll of a couple, said driving means and the rolls of the couples being provided with inter-engaging driving connections.

5. The combination defined in claim 4 including means to support each roll of a couple in either of two positions, one of which positions is so related to one of the alternate positions of said driving means that the roll and driving means will then be in axial coincidence.

6. In combination, a series of vertically spaced roll couples, a series of vertically spaced mountings for the respective roll couples, a vertically extending support at one end of said series, a plate vertically slidable on said support, a motor including a carrier plate pivoted to said first plate on a horizontally extending pivot extending lengthwise of the couples, means to selectively position said carrier plate in different positions about its pivot, and means to connect the shaft of said motor to a roll shaft.

7. In combination, a roll couple having its rolls positioned on opposite sides of a path along which a strip is movable, a mounting for each roll extending transversely of said path and of sufficient length in said transverse direction to support the rolls for movement in a position spaced from said path, a support adjacent said mounting, and driving means for said rolls carried by and movable with respect to said support for selective engagement with either of said rolls when one of the latter is in a position spaced from said path.

8. In combination, a series of vertically spaced mountings, each adapted to support a pair of rolls with their axes substantially parallel, a vertically extending support at one end of the series of mountings, and driving means vertically movable on said support into selective alignment with the axis of the rolls on said mountings.

9. In combination, a series of vertically spaced mountings, each adapted to support a pair of rolls with their axes substantially parallel, a vertically extending support at one end of the series of mountings, and driving means vertically movable on said support into selective alignment with the axis of the rolls on said mountings, said driving means being selectively and horizontally movable to alternate positions with respect to said support to be aligned with the axis of either roll of a pair.

10. In combination, a series of vertically spaced mountings, each adapted to support a pair of rolls with their axes substantially parallel, a vertically extending support at one end of the series of mountings, a plate vertically slidable on said support, a motor including a carrier plate pivoted to said first plate on a horizontally ex-

tending pivot having its axis substantially parallel with the axes of the rolls, and means to selectively position said carrier plate in different positions about its pivot.

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