Feb. 8, 1938. H. H. HENRY 2,107,733

GRID PASTING MACHINE

Filed July 7, 1932 4 Sheets-Sheet 1

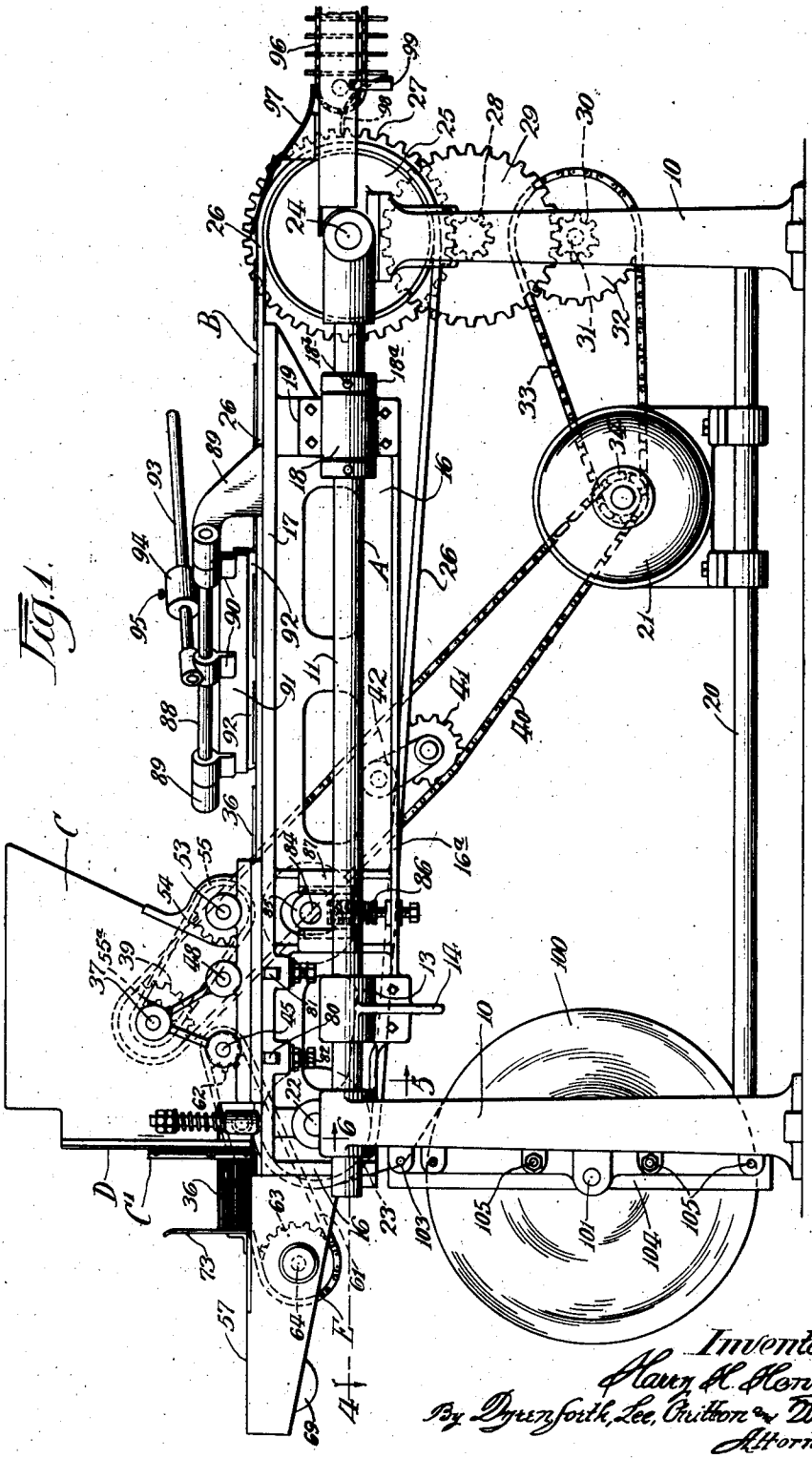


Fig. 1.

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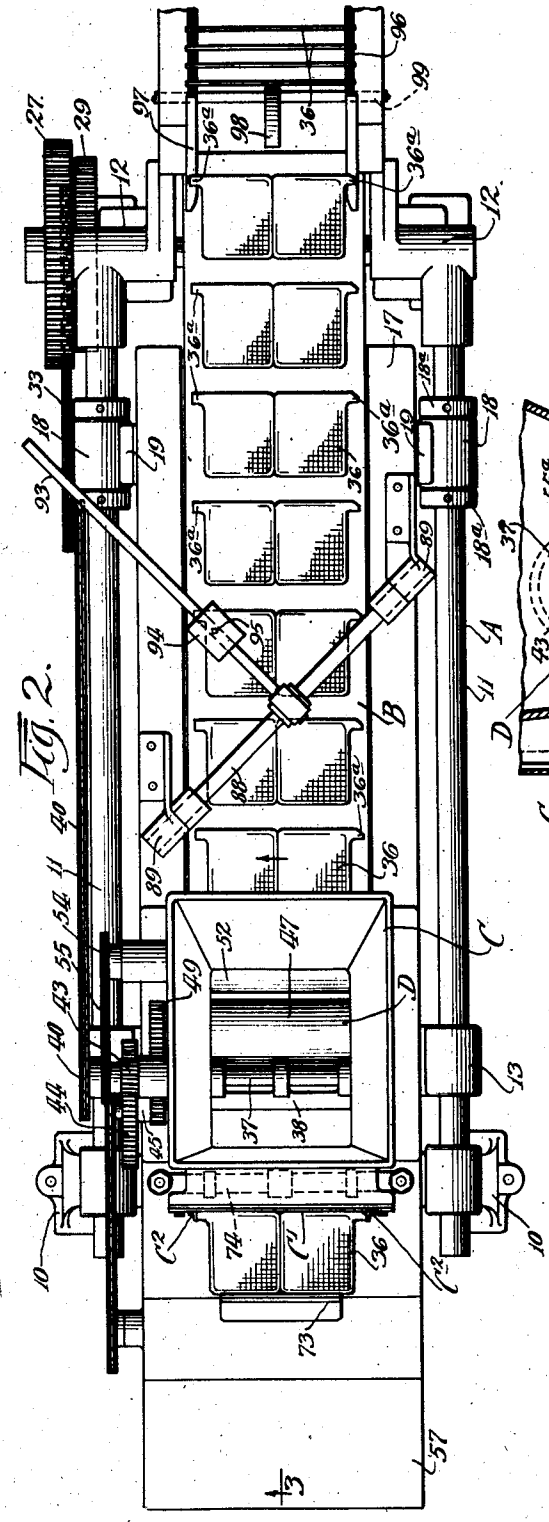


Fig. 2.

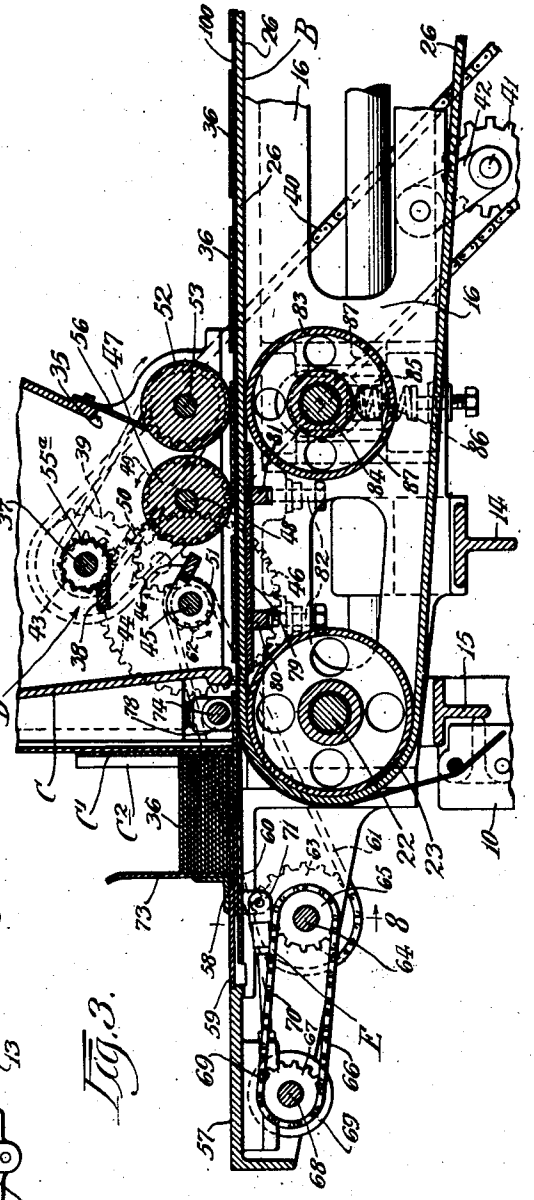


Fig. 3.

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GRID PASTING MACHINE

Filed July 7, 1932 4 Sheets-Sheet 3

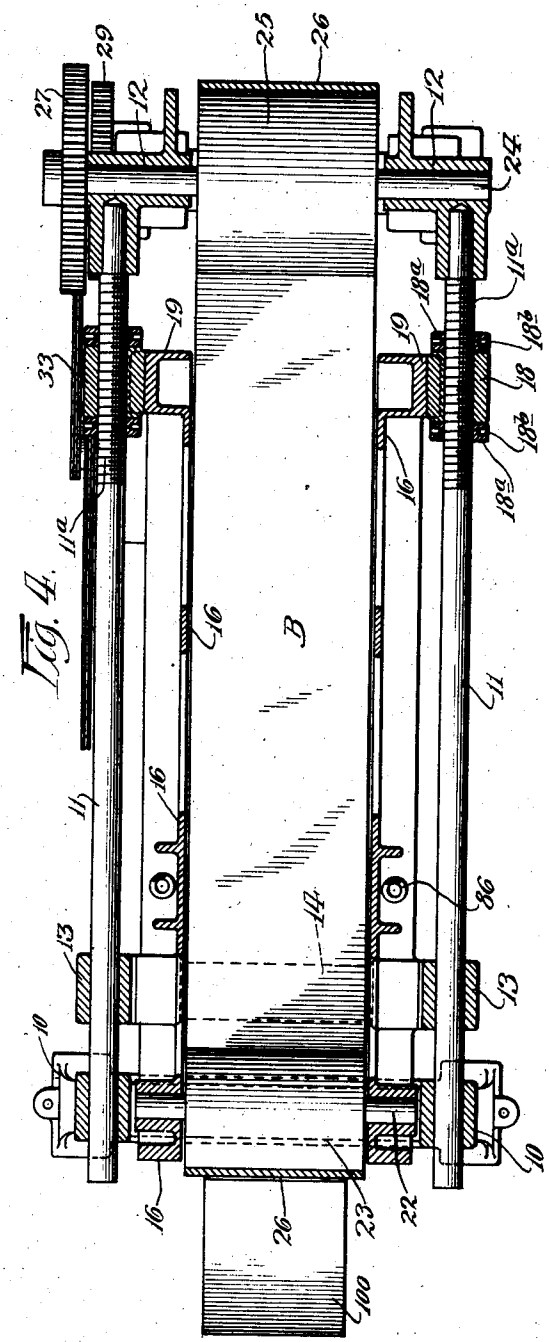


Fig. 4.

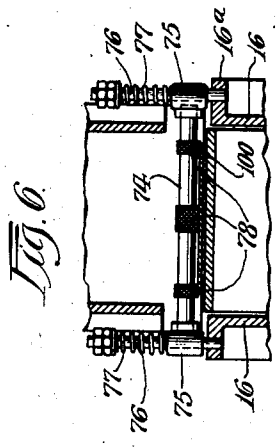


Fig. 6.

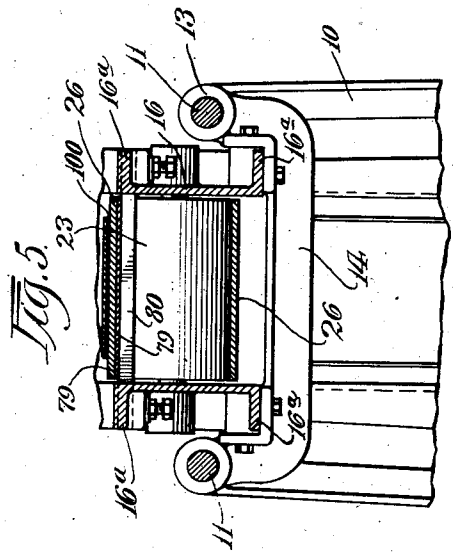


Fig. 5.

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GRID PASTING MACHINE

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Fig. 8.

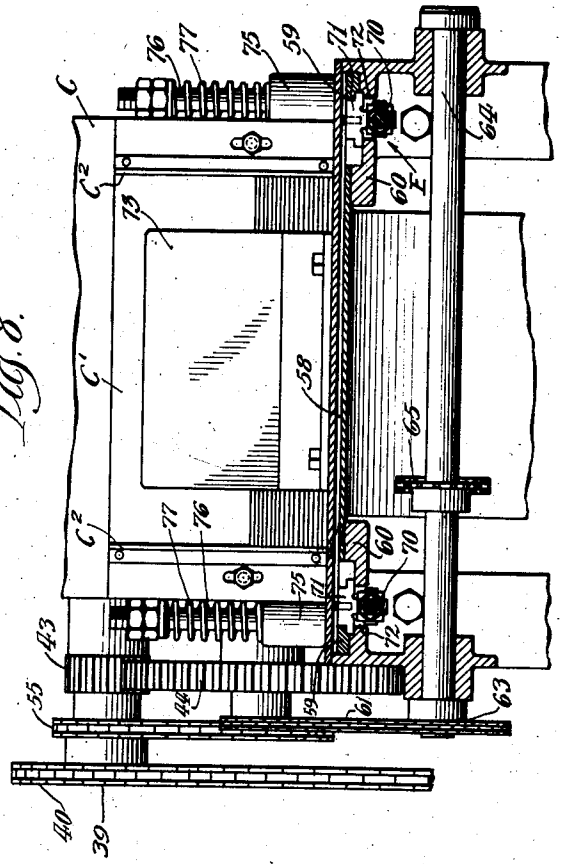


Fig. 11.

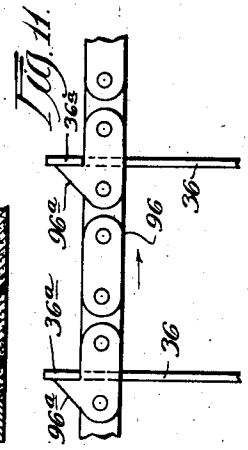


Fig. 10.



Fig. 9.

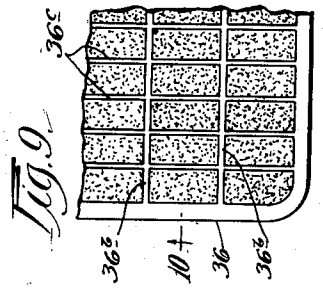
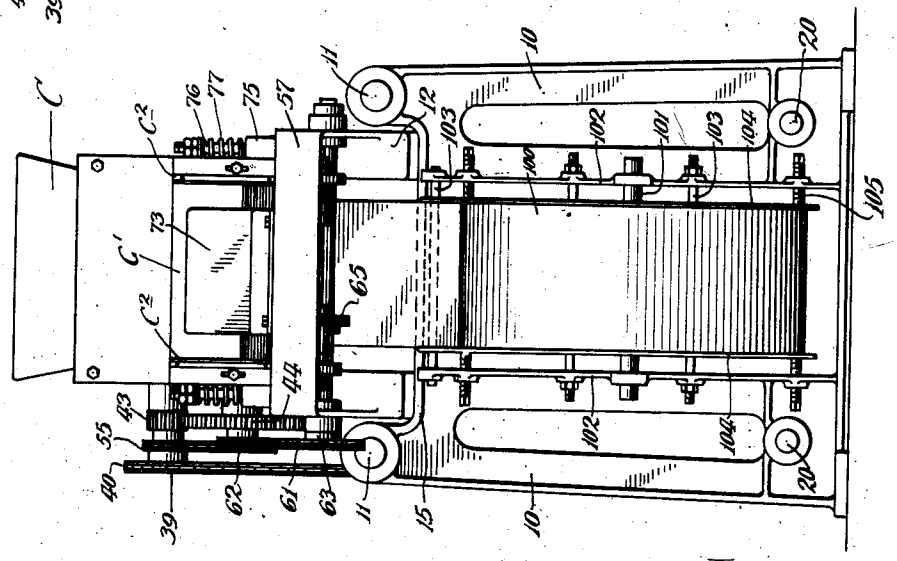


Fig. 7.



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Patented Feb. 8, 1938 2,107,733

UNITED STATES PATENT OFFICE

2,107,733

GRID PASTING MACHINE

Harry H. Henry, Chicago, Ill., assignor, by mesne assignments, to U S L Battery Corporation, Niagara Falls, N. Y., a corporation of New York

Application July 7, 1932, Serial No. 621,265

9 Claims. (Cl. 226—39)

This invention relates to a grid pasting machine and more particularly to a machine for applying the paste to storage battery plates or grids.

One of the objects of the invention is to provide an improved machine of sturdy and simplified construction for applying paste rapidly and firmly to the grids and giving the grids or plates a finished appearance. Other specific objects and advantages, such as providing improved means for wiping the grids, improved means for conveying away the finished grids, etc., will appear as the specification proceeds.

The invention is fully described in the following specification and shown in the accompanying drawings, in which—

Fig. 1 is a side view in elevation of apparatus embodying my invention; Fig. 2, a plan view of the apparatus; Fig. 3, an enlarged broken sectional view, the section being taken as indicated at line 3 of Fig. 2; Fig. 4, a plan sectional view, the section being taken as indicated at line 4 of Fig. 1; Fig. 5, a broken transverse sectional view, the section being taken as indicated at line 5 of Fig. 1; Fig. 6, a broken sectional view, the section being taken as indicated at line 6, of Fig. 1; Fig. 7, a front view in elevation; Fig. 8, a broken transverse sectional view, the section being taken as indicated at line 8 of Fig. 3; Fig. 9, a broken plan view of a portion of the grid to which paste has been applied; Fig. 10, a sectional view, the section being taken as indicated at line 10 of Fig. 9; and Fig. 11, a side detail view of chain apparatus for conveying away the finished plates.

Broadly, the apparatus includes, as illustrated, a supporting frame A, conveyor apparatus B, a hopper for paste C, paste-feeding and packing mechanism D, and grid-feeding mechanism E.

The frame A may be of any suitable construction. In the illustration given, the vertical standards 10 support longitudinal tubular beams 11 which are transversely joined at their rear ends by a tubular cross-beam 12. Near their forward ends, the beams 11 are provided with collars 13 that have integrally formed therewith a T-shaped cross-beam 14. A similar cross-beam 15 is supported by the front standards 10. On each side of the machine is a relatively wide side frame or plate 16, the forward end portion of which rests upon the cross-beams 14 and 15. The rear end portions of the side plates are supported by the collars 13. Each of the beams 11 is provided near its rear portion with a collar 18 which is recessed to receive a short integral extension 19 with which the sides 16 are provided (see Fig. 4). Each side plate 16 is preferably provided with outwardly turned flanges 16a. A bed 17 is secured to and supported by the upper flanges 16a of the side plates 16. Longitudinal beams 20 which are carried by the standards 10 at a point near their base, may be employed to support a motor 21.

With the construction illustrated, the bed 17, sides 16 and the apparatus carried thereby may be bodily shifted, without moving the standards 10, for adjusting the tension of the belt conveyor B. As will be seen more clearly from Figs. 3 and 4, the rear portions of the sides 16 are supported by the shiftable collars 18 while the forward ends of the sides rest slidably on the cross-beams 14 carried by the collar 13 and on the cross-beam 15. Thus by moving the collars 18, the apparatus carried by the bed and sides can be advanced or moved rearwardly on the supporting structure. To facilitate the shifting of collars 18, I prefer to thread the tubular beam 11 at 11a and to secure on opposite sides of each collar 18 the adjustable threaded members 18a. Each of the members 18a is provided with shaft holes 18b into which a shaft or rod may be extended to facilitate the turning of the members.

The conveyor apparatus B may be also of any suitable construction. In the illustration given, a shaft 22 is journaled in the sides 16 at the forward end of the frame and carries a drum 23. Similarly, a shaft 24 is journaled in the hollow cross-beam 12 at the rear of the apparatus and carries a large drum 25. Drums 23 and 25 carry the endless conveyor belt 26. In order to drive shaft 24, there is fixed to one end thereof a large gear 27 which meshes with a pinion 28 carried by intermediate gear 29. The gear 29 is in turn driven by pinion 30 on the shaft 31 of sprocket wheel 32. The wheel 32 is connected by chain 33 to the sprocket 34 which is fixed to the drive shaft of motor 21.

The hopper C, which may be constructed in any suitable shape or form, rests upon and is secured to the sides 16. As shown more clearly in Fig. 3, a portion of the hopper is cut away on its rear side, as indicated at 35 so as to leave an aperture along the bottom portion of the rear wall. The bottom of the hopper is supported by the sides 16 a short distance above the belt 26 so as to permit the grids 36 to be carried along the bottom side of the hopper. On the front side of hopper C is a vertically adjustable plate C' which extends above the belt 26 and which allows only the bottom-most grid to pass into the

hopper. The plate C' is confined between angle-irons C^2 which also serve as lateral guides for the grids.

The grid-feeding and packing mechanism D is preferably so arranged as to feed the paste constantly down to the moving grids, while at the same time packing the paste firmly and thoroughly into the interstices of the grid. In the illustration given, journaled within the hopper C at an intermediate height is a shaft 37 which carries the blade 38. The shaft 37 is provided at its outer end with a sprocket wheel 39 driven by chain 40. The chain 40 engages a sprocket carried by the shaft of motor 21. If desired, an idle sprocket wheel 41 carried by adjustable bracket 42 may be employed to place the desired tension upon chain 40. The shaft 37 also carries a pinion 43 which meshes with the large gear 44 on shaft 45. Shaft 45 extends into the hopper C and carries a blade member 46. To the rear of the blade-equipped paste-feeding member 46 is a rotatably mounted tamping or packing roller 47 journaled upon shaft 48. The shaft 48 carries upon its end extending outside of the hopper C a gear 49 which is driven, through intermediate gear 50, by the pinion 51 carried by shaft 45.

Disposed in the rear end of the hopper C and behind the roll 47 is a buffing roll 52 which is fixed to shaft 53. The roll 52 is preferably formed from metal and is employed to engage the upper surfaces of the grids as they are advanced by belt 26 so as to pack the paste firmly into the grids and to finish or polish the upper surface thereof. Shaft 53, which carries the roll 52, extends outside of the hopper C and carries at its end a sprocket wheel 54. Sprocket wheel 54 is connected by means of chain 55 to a sprocket 55^a carried by the shaft 37. Preferably the sprocket 53 is of smaller diameter than the sprocket 54 so as to cause relatively rapid rotation of the roll 52. Secured to the rear wall of the hopper C is a scraper or doctor knife 56 which engages the forward portion of roll 52 and serves to remove the paste which would otherwise collect upon the surface of the roll.

The grid-feeding mechanism E may be of any effective form for feeding the grid plates to the conveyor belt 26. In the illustration given, a rear platform 57 is secured to the sides 16 of the frame and provides a support for the grids and for the feeding mechanism. The grid plates 36, formed in pairs, and having at their forward ends the laterally projecting ears or extensions 36^a, are stacked upon the platform to the rear of the hopper C. A reciprocating plate 58 is guided between spaced strips 59 and 60 so as to force the grids, one at a time, upon the moving conveyor 26. Any suitable means for reciprocating the plate 58 may be employed. In the illustration given, a chain 61 driven by sprocket 62 on shaft 45 drives a sprocket wheel 63 on shaft 64. The shaft 64 is rotatably mounted in the platform extension 57 and is equipped at an intermediate point with a sprocket 65. The chain 66 connects sprocket 65 to a sprocket 67 which is fixed to a shaft 68 mounted in the forward part of extension 57. The shaft 68 is equipped at either end with an eccentric 69 connected by arm 70 to a depending bracket 71. Each of the brackets 71 extends through slots 72 in the plate 60 which permit reciprocation of the driven plate 58. A vertical wall 73 is secured to the platform 67, as shown in Figs. 1 and 3, to provide a compartment for the stack of grids 36.

For feeding the grids into the hopper C, I prefer to employ a pressure roller 74 which holds the grids firmly against the belt 26 and guides them below the front hopper wall. The pressure roller 74 has its free ends rotatably mounted in the bosses 75 (Fig. 6) which are slidably carried by fixed shafts 76. A spring 77 carried by shaft 76 urges the bosses 75 downwardly. The pressure roller 74 is preferably provided with raised integral collars 78 which are provided with a superficial roughened surface or knurling. In order to avoid injury to the cross bars of the grid, the collars 78 are preferably disposed, as shown in Fig. 6, with the wide collar traveling over the central portion of the pair of grids while the narrow end collars travel along the outer sides of the grids.

To support the belt 26 as it travels under the open end of the hopper C, I prefer to employ an adjustable platen 79 which is supported by a pair of spaced cross strips 80 and 81. The ends of the cross strips 80 and 81 are adjustably supported by screws 82 which threadedly engage bosses carried by the side walls 16. With this arrangement, the ends of the platen 79 may be tilted in either direction as desired. The platen 78 terminates just short of the buffing roll 52.

To support the belt 56 immediately below the buffing roll 52, I prefer to employ a large yieldably mounted roll 83. As shown more clearly in Figs. 1 and 3, each end of shaft 84 upon which roll 83 is carried, is journaled in a sliding block 85. The block is yieldably supported by the spring 86 within the guides 87. As illustrated, the rolls 52 and 83 are in true vertical alignment.

After the grids have passed through hopper C, I prefer to subject them to the operation of improved wiper apparatus. As illustrated more clearly in Figs. 1 and 2, a rotatable member 88 is journaled in brackets 89 supported by bed 17 and carries by means of collar clamps 90 a frame member 91. Clamped to the frame 91 is a flexible wiping element 92, which may be of any suitable material such as, for example, rubber. The wiping element 92 is supported obliquely with respect to the belt 16 by reason of the spacing of the bracket members on bed 17, one bracket member being supported on one side of the bed well in advance of the bracket member on the opposite side of the bed. Rigidly secured to the middle collar 90 is a shaft 93 upon which is slidably mounted a weight 94 which may be releasably secured in position by the screw 95.

In order to convey away the finished grids, I employ any suitable conveyor apparatus as, for example, the chain conveyors 96, which are shown in part in Figs. 1, 2 and 11. Such apparatus is of well known construction and need not be described in detail. Supported on each side of the bed 17 and curved downwardly toward the chains 96 are tracks or guide members 97 which are adapted to receive the lateral projections or ears 36^a of the grids. The tracks 97 which support the lateral extensions 36^a permit the main body of the grids to swing to a vertical position upon the chains 96. To prevent the grids from striking together as they swing downwardly to vertical position, I prefer to employ a curved spring member 98 which is supported by a cross strip 99. At intervals along the chain 96 are provided lugs 96^a which engage the ears 36^a of grids 36 and positively carry them forward. The grids 36, as illustrated more clearly in Figs. 9 and 10, are provided with the relatively heavy

horizontal beams or cross strips 36b and with the somewhat thin vertical rods 36c.

In order to hold the grids 36 in accurate position upon the belt 26, I prefer to draw a web of paper across the top portion of the belt as it passes beneath the hopper C and over the bed. For this purpose, a roll of paper 100 may be supported on shaft 101 which is journaled in flanges 102 carried by the standards 10. The paper may be fed up through the guide roller 103 over the roll 23 and along the top portion of the belt. At the end of the journey of the grids, when they are removed from the belt 26 to the chain conveyor apparatus 96, the paper waste may be allowed to fall to the floor where it may be removed. Preferably, the paper roll is supported between metal strips 104. In order to place the desired amount of friction upon the paper roll so as to cause it to feed smoothly and without too rapid unrolling, I prefer to employ friction screws 105 which are supported in spaced order by the flanges 102 and which engage the disks 104.

Operation

In the operation of the apparatus, the grids, molded in pairs with the lateral projections 36a extending outwardly, are placed in a stack at the forward end of the machine and within the wall 73. The reciprocating feed plate 58 engages the bottom-most grid and feeds it forwardly to the pressure roll 74. The roll 74 guides the grid below the forward wall of the hopper C. Within the hopper C, the agitating or feeder-blades 38 and 46, which rotate in the direction indicated by the arrows, feed the paste downwardly into contact with the incoming grid. The roll 50, which rotates counterclockwise, as indicated by the arrow, presses the paste firmly into the interstices of the grid. The buffer roll 52, which is rotated rapidly in the opposite direction, that is, in a clockwise direction, also serves to pack the paste into the grid while, at the same time, it polishes and finishes the top side thereof. In the paste-packing operation, the tiltable platen 79 may be used to advantage to hold the grid firmly in contact with the packing roll 50. I prefer to tilt the rear end of the platen 79 slightly upwardly. The slight downward cupping of the grid serves to offset the up-cupping produced by the buffer roll 52, with the result that the grid leaves the hopper in substantially flat condition. The yieldable roll 83, serves to prevent injury to the apparatus as when two grids in superposed relation should be brought by accident in contact with the rapidly moving roll 52. In such event, the yieldable roll permits the grids to pass through. At the same time, the roll 83 maintains an even pressure against the belt 26 just below the roll 52 and provides the uniform degree of up-cupping desired. The conveyor belt 26 carries the grids 36 in spaced relation below the wiper member 92. By employing a flexible member together with a weighted or adjustable means for exerting pressure thereon, the operator is able to remove from the grids the desired amount of paste and to place them in substantially finished condition. The adjustable weight 94 may be shifted to the point desired and there locked in position by screw 95. The angular arrangement of the wiper member permits the desired amount of pressure to be exerted without at the same time breaking the somewhat fragile vertical strips 36c. The angular position of the wiper causes it to rest at all times upon a number of the rather heavy cross strips or beams 36b. At the same time, this arrangement prevents the wiper member from digging into the body of the grid and removing more of the paste at one point that at another. The adjustable wiper straightens or flattens any grid which may be bent and insures a uniform thickness.

The grids after passing the wiper are conveyed by belt 26 to the inclined tracks 97 where the grids are separated from the paper web. The tracks 97 engage the lateral projections or ears 36a of the grids and support the projections while the main body of the grids swings to a vertical position sliding on to the chain conveyor 96. A curved buffer spring or strip 98 is supported by the cross piece 99 so as to prevent clashing of the grids as they swing to vertical position. The curved member 98 engages the central portion of the grids and allows them to move gently to vertical position. The finished grids are conveyed away by the chains 96 to a desired point where they are removed. With the apparatus described, the work frame which supports the packing apparatus etc., may be shifted upon the supporting structure without moving the standards 10. By turning the members 18a, the collar 18 upon each of the beams 11 may be shifted forwardly or backwardly. At the same time, the sides 16 and bed 17 are moved with the collar 18, the front portion of the sides 16 sliding upon the supporting cross-beams 14 and 15. By this mechanism, the tension of the conveyor belt 26 may be readily adjusted.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

I claim:

1. In a grid pasting machine, a frame, a hopper for paste mounted on said frame, belt means for advancing grids through the hopper, packing mechanism in said hopper, and a tilted adjustable platen supported below said belt and below said hopper.

2. In a grid pasting machine, a frame, a hopper for paste mounted on said frame, said hopper being open at its bottom side, belt means for advancing grids through the hopper, a packing roller rotatably mounted in said hopper, a buffing roller also rotatably journaled behind said packing roller, and a tiltable plate adjustably mounted below said belt and below said hopper.

3. In apparatus of the character set forth, supporting standards, longitudinal beams carried thereby, a cross-beam carried by said longitudinal beams, a work frame having one end slidably supported by said cross-beam, adjustable collars slidably engaging said longitudinal beams and supporting the other end of said frame, a drum rotatably mounted in said work frame, a second drum rotatably carried by a pair of said standards, an endless belt carried by said drums, and an open-bottomed paste hopper supported over said belt in close proximity to said belt so that the belt serves as a bottom closure for the hopper.

4. In a grid pasting machine, supporting standards, adjustable beams carried thereby, a slidable work-frame supported on said beams, a drum rotatably mounted in said work-frame, a second drum rotatably carried by a pair of said standards, an endless belt carried by said drums,

means for adjusting said slidable frame longitudinally, an open-bottomed paste hopper, and means for supporting said hopper above said belt so that the belt serves as a bottom closure for the hopper.

5. In a grid pasting machine, a frame, a hopper for paste mounted on said frame, an endless belt for advancing grids through the hopper, rotatable feeder means and packing means in said hopper, a driven roller rotatably journaled behind said packing means, and a tiltable plate adjustably mounted below said belt and below said hopper.

6. In a grid pasting machine, a frame, a hopper for paste mounted on said frame, an endless belt for advancing grids through the hopper, a driven roll mounted in the hopper for packing paste into the grids, and a tilted platen supported below said belt and having one end extending below said packing roll.

7. In a grid pasting machine, a frame, a hopper for paste mounted on said frame, an endless belt for advancing grids through the hopper, a tilted plate adjustably mounted below said belt and below said hopper, a packing roll and a polishing roll mounted in said hopper so that one end of said plate lies substantially between said rolls.

8. In a grid pasting machine, a frame, an open-bottomed paste hopper carried by said frame, a pair of drums rotatably mounted at opposite end portions of said frame, an endless belt carried by said drums and closing the bottom of said paste hopper, and a tiltable plate adjustably mounted below said belt and below said hopper.

9. In a grid pasting machine, a frame, an open-bottomed hopper for paste mounted on said frame, a pair of drums rotatably mounted at opposite end portions of said frame, an endless belt carried by said drums and closing the lower end of said hopper, adjustable means for tightening said belt, and an adjustable platen supported by said frame below said belt and extending substantially across the bottom of said hopper.

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