Oct. 15, 1957 S. A. EARNSHAW 2,809,865

MACHINE FOR APPLYING MATERIAL TO WALLS AND OTHER OBJECTS

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Fig. 1.

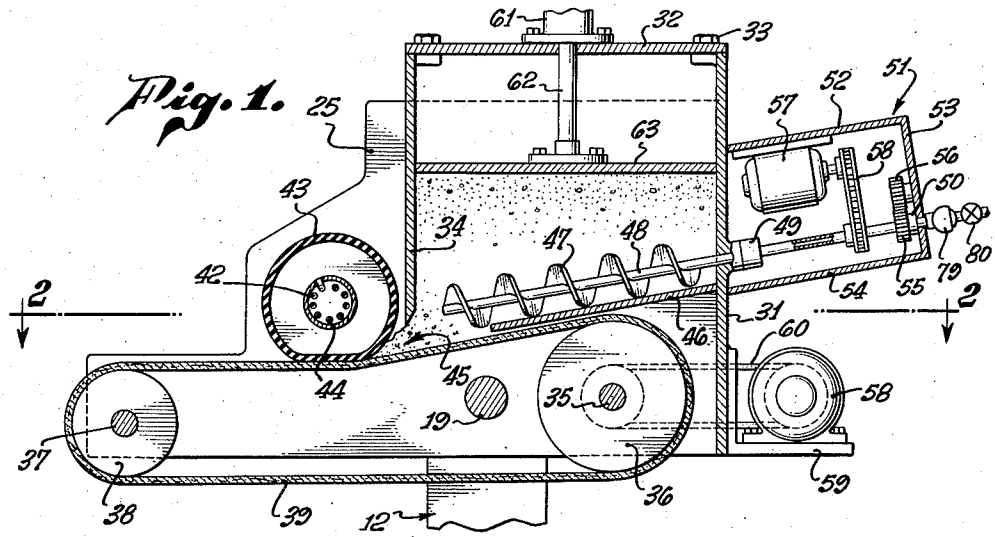
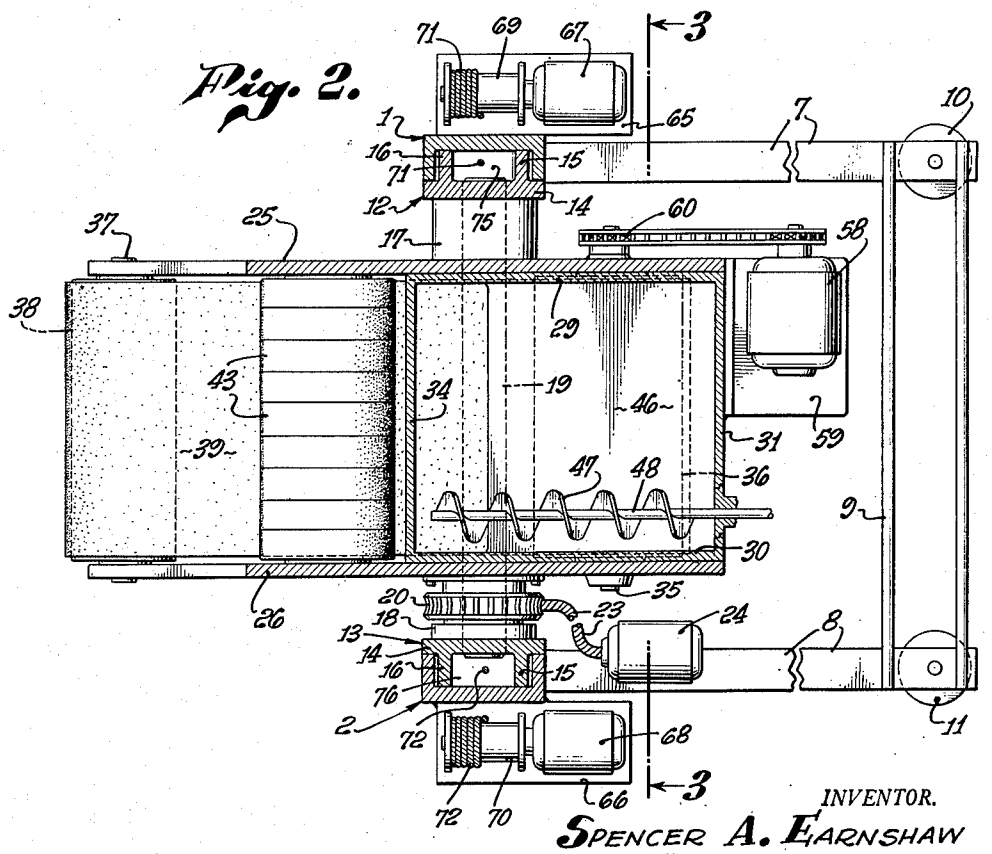


Fig. 2.



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Fig. 3.

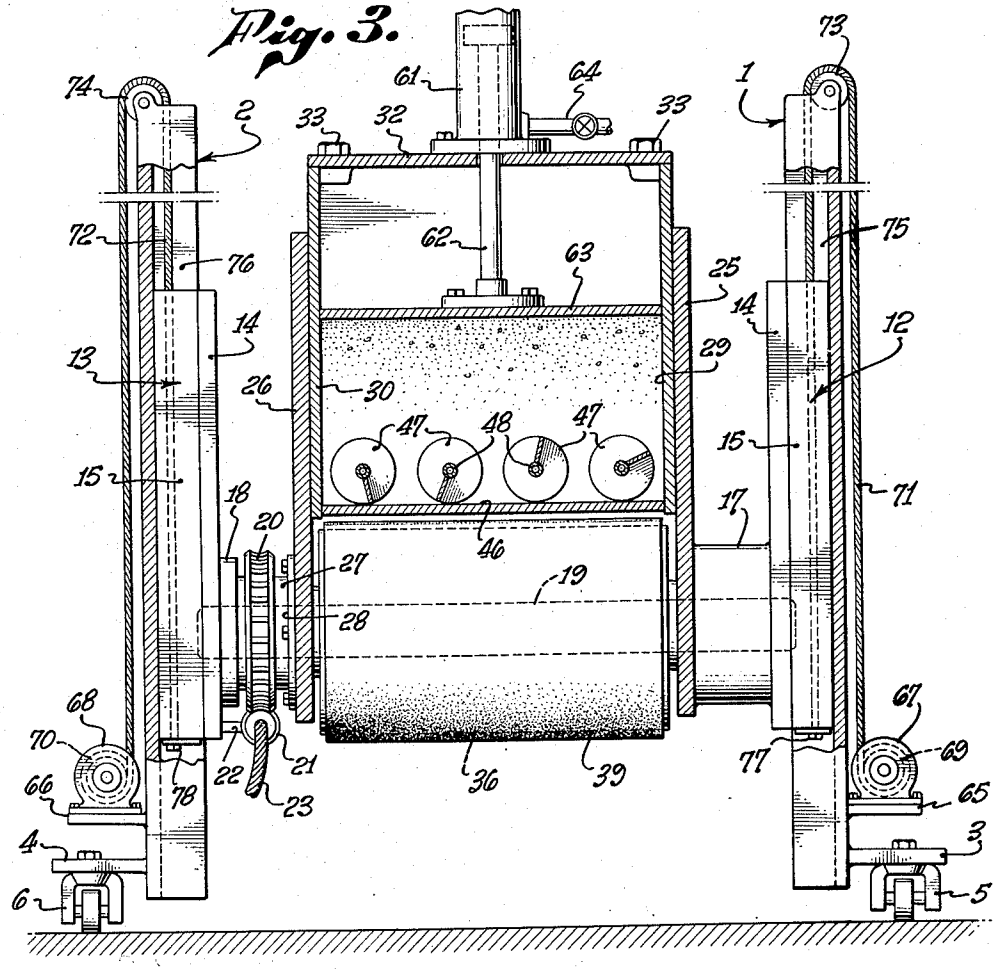


Fig. 4.

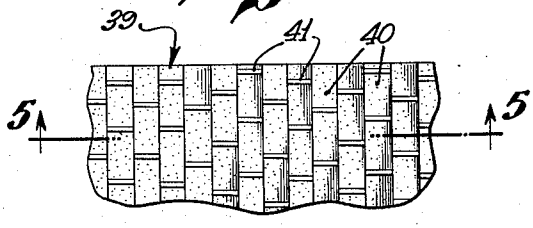


Fig. 5.



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United States Patent Office 2,809,865 Patented Oct. 15, 1957

2,809,865

MACHINE FOR APPLYING MATERIAL TO WALLS AND OTHER OBJECTS

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Application May 22, 1953, Serial No. 356,764

6 Claims. (Cl. 299—62)

The present invention constitutes a continuation in part of application for machine for applying material to walls, filed April 30, 1948, Serial No. 24,338, now Patent No. 2,639,943, and application for Coating Machine, filed June 20, 1949, Serial No. 100,147, now Patent No. 2,681,725.

The present invention provides a controlled machine which will automatically and expeditiously apply various materials to a surface. By way of example, the present invention will apply plaster to a wall; form clay pipes; apply paint to a surface; make tile, and shot peen a surface.

An object of the invention is the provision of a coating machine which will apply wet and dry material under pressure to various articles.

A further object is the provision of a coating machine which is efficient in operation, dirigible in character, easily handled by workman, and which is superior to coating machines now known to the inventor.

With the above mentioned and other objects in view, the invention consists in the novel and useful provision, formation, construction, association, and relative arrangement of parts, members and features, all as shown in one embodiment in the accompanying drawings, described generally, and more particularly pointed out in the claims.

In the drawings:

Figure 1 is a longitudinal vertical sectional view of the machine of the invention,

Figure 2 is a sectional view on the line 2—2 of Figure 1,

Figure 3 is a sectional view on the line 3—3 of Figure 2,

Figure 4 is a fragmentary plan view of a belt which may be used in the practice of the invention, and,

Figure 5 is a sectional view on the line 5—5 of Figure 4.

Referring now with particularity to the drawings, a suitable framing is provided, which includes, as shown in Figure 2, uprights 1 and 2 provided at the lower ends thereof with brackets 3 and 4, which brackets carry casters 5 and 6, together with horizontal framing members 7 and 8, which are parallel and secured to the uprights 1 and 2, with a transverse member 9 joined to members 7 and 8. This provides an open framing. Casters are provided at 10 and 11 for supporting the rear of the framing.

The uprights 1 and 2 are of channel form, the channels facing inwardly, as best shown in cross section in Figure 2. Slide members 12 and 13 are adapted to be guided by the uprights 1 and 2. Each slide member 12 and 13 has a base wall 14 equal to the base width of the uprights 1 and 2, and two leg portions 15 and 16, which fit within the channels of the uprights. The uprights have greater length than that of the slide members. Each slide member adjacent the lower end thereof is provided with a boss portion, as shown at 17 and 18, and extending between the two boss portions and journaled therein, is an axle 19. Secured on the axle and adjacent the boss portion 18 is a gear 20, and pinion 21 meshes with said gear, the pinion being supported by an extension 22 secured to the slide 13. The pinion

21 is adapted to be rotated by a flexible shaft 23 connected to a motor 24 carried on the frame member 8. Carried by the axle 19 are a pair of spaced-apart, parallel side walls 25 and 26. The boss 17 spaces the slide 12 from side wall 25. The gear 20 is provided with an extended hub 27, to which is secured an annular plate 28, the plate being provided with transverse bores, through which bolts are passed for the purpose of securing the side wall 26 thereto, it being intended that when the gear 20 is rotated, that the side walls 25 and 26 likewise be rotated upon the axle 19.

To give stability to the side walls 25 and 26, and likewise to provide a hopper for containing material to be fed by the machine, as hereinafter set forth, there is provided adjacent to and secured to the side walls, walls 29 and 30, and a rear wall 31 joins walls 29 and 30 (see Figure 2). A cover 32 overlies the walls 29, 30 and 31, and, as shown in Figures 1 and 3, the said cover 32 is detachably secured to said walls by any convenient means, such as shown at 33. A front wall 34 depends, for a certain depth, between the walls 29 and 30. The axle 19 is within the confines of the walls 29, 30, 31 and 34. Also extending transversely between the walls 25, 26, 29 and 30, and suitably journaled in said walls is a shaft 35, carrying a roller 36. It will be observed that the side walls 25 and 26 are not enclosed at the bottom, and that the roller 36 depends below said side walls, as shown in Figure 1. The side walls 25 and 26 are of extended length and vary in height in accordance with mechanism secured therebetween. Thus, at the forward end of said side walls is a shaft or axle 37 extending transversely therebetween and suitably journaled in said side walls and upon said axle or shaft is mounted a front roller 38. Over the rollers 36 and 38 is passed a continuous belt 39. This belt is of particular construction, as best illustrated in Figures 4 and 5. The belt may be formed of any material suitable for the purpose, such as canvas provided with a rubber or rubber composition face, the face of the belt being provided with pockets 40 of mill-tooth form, with ridges 41 transversely interrupting the pockets, and which ridges are arranged in staggered relationship so far as rows of the mill-tooth pockets are concerned.

An axle 42 extends between the side walls 25 and 26, being suitably journaled therein, the said axle carrying a plurality of inflatable rollers 43, which rollers are adapted to bear against the surface of the upper stretch or reach of the belt 39, as shown in Figure 1. In place of a plurality of rollers 43, I may use a single inflatable roller, or, in the case of multiple rollers, as shown in Figure 2, the axle 42 is preferably tubular in form and carries a series of tubes leading to each roller. One end of said axle exposes the valve ends 44 of the tubes, whereby individual inflation, to any desired pressure, may be provided for each roller.

The rollers 36 and 38 are of different diameters and the series of rollers 43 serve to depress the upper stretch of the belt between the rollers 36 and 38. The depression of the belt occurs forwardly of the front wall 34, it being observed that this wall terminates above the belt, and provides a transverse slot 45.

Within the hopper and lying between the walls 29, 30 and 37, is a base 46. The base 46 slants downwardly toward the slot 45 overlying the upper reach of a portion of the belt 39 and terminating rearwardly of the wall 34.

Immediately above the base 46 are a series of feed worms 47, the outer ends of which terminate spacedly of the wall 34. The feed worms are in parallel relationship, as shown in Figure 3, and each feed worm is mounted upon a hollow shaft 48, each hollow shaft being passed through suitable bearings 49 and 50. In this manner, each worm 47, within the hopper, is stabilized,

An enclosure or housing 51 is secured to the wall 31. This enclosure or housing has a top wall 52, end wall 53, and a bottom wall 54, together with side walls which are not shown in the drawing. The end wall 53 supports the bearing 50, and carried on each hollow shaft 48 is a gear 55, there being idler gears 56 carried by the wall 53, in mesh with adjacent gears 55, so that rotation of one of the worm shafts produces rotation of all said worm shafts. Said rotation is accomplished by providing a motor 57, which is suspended from the top wall 52. The shaft of the motor carries a sprocket and a sprocket is mounted upon one of the shafts 48, with a continuous chain 58 extending between said sprockets.

For rotating drum 36, I provide a motor 58 carried on a suitable platform 59, which platform, as shown in Figure 1, is attached to the wall 31, the shaft of said motor and the axle 35 both being provided with sprockets, between which extends a continuous chain 60.

I have found it expedient, depending upon the character of the material to be handled by the machine, to provide a hydraulic piston for at all times feeding coating material to the worms 47. This may take the form of a hydraulic cylinder 61, within which is the usual piston, the piston arm 62 engaging a compressor plate 63, having a dimension such as to fit within the confines of the walls of the hopper. A connection 64 is made with the cylinder, together with a suitable valve means, whereby air or other fluid under pressure may be admitted to the cylinder to raise and lower the piston and thereby lower the compressor plate 63.

I provide means whereby the slides 12 and 13 may be raised and lowered. Thus, secured adjacent the lower ends of the uprights 1 and 2 are platforms 65 and 66, to which are bolted motors 67 and 68, with each motor shaft provided with a drum, at 69 and 70. Cables 71 and 72 are rove about the drums, and passed upwardly parallel to the uprights 1 and 2, as shown in Figure 3, and over sheaves 73 and 74, then downwardly in the spaces 75 and 76 included between the respective uprights and the slides and fastened to the bottom of each slide, as shown in Figure 3, at 77 and 78.

The operation, uses and advantages of the invention just set forth, are as follows:

The hopper, upon removal of the cover 32, which will carry with it the hydraulic cylinder 61 and the compressor plate 63, may be filled with any material desired, such as clay for pipe, either wet or dry, cement and sand, shot, or other material. However, assuming for the purpose of this description that plaster is placed within the hopper, the plaster will rest on the base 46 and embed the various worms 47, with some plaster resting on the belt 39 forwardly of the feed worms. The cover 32 is replaced, together with the compressor plate 63 and the plaster brought under pressure through line 64, under control of a valve so that the plaster always will be fed to the feed worms. The motors 57 and 58 are energized so that the belt 39 will travel in a counter-clockwise direction, viewing Figure 1, and the feed worms 47 will be rotated to feed the material from the hopper through the slot 45, and between the inflatable or pneumatic rollers 43 and the surface of the belt 39. As the material is fed from the hopper, the slides 12 and 13 are raised, which will elevate the machine as an entirety when the motors 67 and 68 are energized. The operator of the machine has a suitable controller which he operates to control all of the motors. The motor 24 is operated so as to tilt the machine relative to the uprights and slides. The motors are all of the reversible type, that is, motors 67 and 68 may raise or lower the machine, while motor 24 may tilt the machine upwardly and downwardly, or cause a complete rotation of the machine, such as might be necessary for the plastering of a ceiling. The material in the hopper, by being under pressure from the compressor plate, will at all times feed the material to the feed worms, and regardless of the inclination of the machine. As the pneumatic rollers 43 are closely adjacent the slot 45, the material carried by the belt will at all times be moved with the belt after passing beneath the said rollers 43.

A feature of the invention is the provision of the hollow shafts 48 for the feed worms. As shown in Figure 1, each hollow shaft extends beyond the end wall 53 and is connected to a swivel 79, the swivel, in turn, connecting with a valve 80, the valve leading to either a source of air under pressure or to water, or any other medium, the purpose being to direct fluid through the hollow shaft and into the material being fed from the hopper through the slot 45. This may be necessary, under certain conditions, where aeration or a wetting of the material is desired.

The belt 39 by being provided with teeth, pockets or cavities of the form shown in Figures 4 and 5 of the mill or buttress type, with the faces thereof moving forwardly when the belt is in motion, permits the material fed from the hopper by the feed worms through slot 45 to fill the pockets and still be positively moved forwardly during belt motion. The rollers 43, which are regulated as to pressure exerted against the surface of the belt, rides on the ridges 41, with the result that the material, whatever its nature, in the belt pockets, is not compressed in such a manner as to have it ejected as between the belt surface and the rollers in a packed form. This is particularly true where wet clay is the material within the hopper. By forming the belt in the manner described, clay is carried in the pockets, that is, in the zones included between the vertical faces of the teeth and the inclined faces and such material is then thrown by centrifugal force from the belt as the belt passes over the roller 38. The speed of travel of the belt is, of course, regulated by the operator by regulating the speed of rotation of the motor 58.

While I have shown a series of rollers 43, it is evident that a single transverse pneumatic roller might be substituted, and this roller, as stated, holds the material within the surface pockets of the belt during movement of the belt, and particularly that stretch of the belt immediately forwardly of the hopper wall 34. In a measure, the roller or rollers 43 act to assure that the material directed from the hopper through slot 45 is received within the pockets or cavities of the belt. In place of staggering the various ridges, as shown in Figure 4, the ridges may be in parallel lines.

In some adaptations and uses of the invention as, for instance, the use of shot in shot peening, the rollers 43 may be used with a smooth surfaced belt, or the belt provided with surface pockets may be used independent of the rollers 43.

Assuming that the operator has full control of the machine and that the belt is traveling at a high rate of speed, the material will be thrown from the belt after passing between the rollers 43 and the belt surface, and specifically at the time that the belt passes around the roller 38, with centrifugal force of high magnitude, with the result that the plaster, if plaster is used, will adhere to the surface to be plastered. The operator, by tilting the machine by energizing motor 24, and likewise energizing motors 67 and 68, raises the machine as work proceeds.

A machine of the character just described, handled by a skilled operator, can easily plaster the side walls of a large room in less than twelve minutes, and by inclining the machine or rotating it, the ceiling may be plastered at the same time.

In the case of clay, the clay may be thrown from the belt surface to coat pipe or to form pipe on a mold, the mold being rotated as the material is thrown against the mold.

In the case of tile, the clay material, if a clay tile is to be formed, is directed forcibly into the molds.

For shot peening, the hopper may be filled with shot

and directed with considerable force against a metallic object to be peened. Obviously, such an operation would likewise clean a surface, if so desired, and the centrifugal force exerted is easily regulated by regulating the speed of the motor 58.

I claim:

1. In a device of the character disclosed, a framing provided with uprights, slides carried by said uprights, a pair of spaced rollers, and means mounting said rollers to said slides, a continuous resilient surfaced belt extending between said rollers, the said belt transversely provided with surface pockets of saw tooth form, means for rotating one of said rollers to cause movement of said continuous belt, means for positively feeding work onto the surface of said belt to be discharged from the pockets of said belt by centrifugal force, means for raising said slides during said belt travel, and means for tipping the belt to desired acute angles relative to a horizontal plane to direct the path of movement of the work discharged from the belt pockets.

2. In a machine of the character disclosed, a hopper for holding work, a multiple number of parallel feed worms within said hopper and in open contact with work for positively moving and covering the width of the work therefrom, a continuous resilient surface belt provided with surface pockets having its upper stretch in part received within said hopper and externally of said hopper, means mounting said continuous belt for movement, the said feed worms directing the work under velocity into the pockets of said belt to be centrifugally thrown from said belt pockets during said belt movement.

3. The structure as set forth in claim 2, characterized in that a hydraulically actuated plunger is fitted within the hopper for applying pressure to the work therein, whereby the feed worms at all times move the work onto the belt.

4. The machine of claim 2, characterized in that the feed worms are carried on axial tubular shafts, means for rotating said shafts to rotate the feed worms, and means whereby a fluid may be introduced into said tubular shafts for discharge into the work being fed by said feed worms onto the belt.

5. In a machine of the character disclosed, a continuous resilient surfaced belt formed on its surface with pockets, means mounting said belt for travel, a pneumatic roller positioned transversely of said belt and in contact therewith, said pneumatic roller being formed with parallel sections individually inflatable to desired pressures, means for feeding work to the surface of said belt adjacent the periphery of said pneumatic roller, and whereby when the belt is in movement, the roller is rotated to hold the work received on the belt surface in the pockets thereof.

6. In a machine of the character disclosed, a continuous resilient surfaced belt transversely provided with surface pockets of saw-tooth form, means mounting said belt for travel, a roller provided with a resilient tread positioned transversely of said belt, means effecting pressure contact of said roller with said belt, means for feeding work to the surface of said belt adjacent the periphery of said roller and whereby when the belt is in movement, the roller is rotated by frictional contact with said belt to hold the work received on the belt surface in the pockets thereof.

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