

Aug. 15, 1967

C. J. DI GRADO ET AL

3,335,700

APPARATUS FOR APPLYING SILICONE TO THE BARRELS OF SYRINGES

Filed May 26, 1966

4 Sheets-Sheet 1

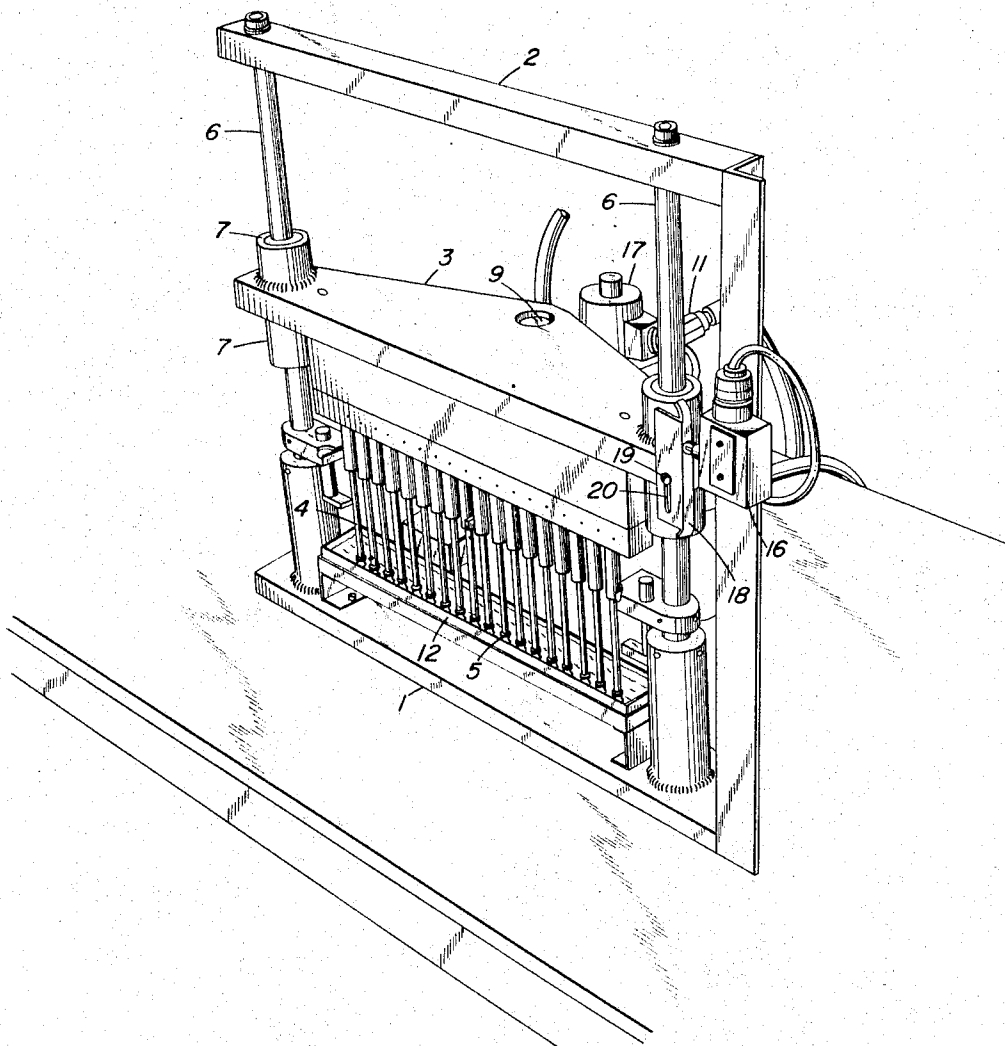


FIG - 1

INVENTORS.
COSTABILE JOSEPH DI GRADO
EDWARD ROELOFFS
BY

Norton S. Johnson

ATTORNEY

Aug. 15, 1967

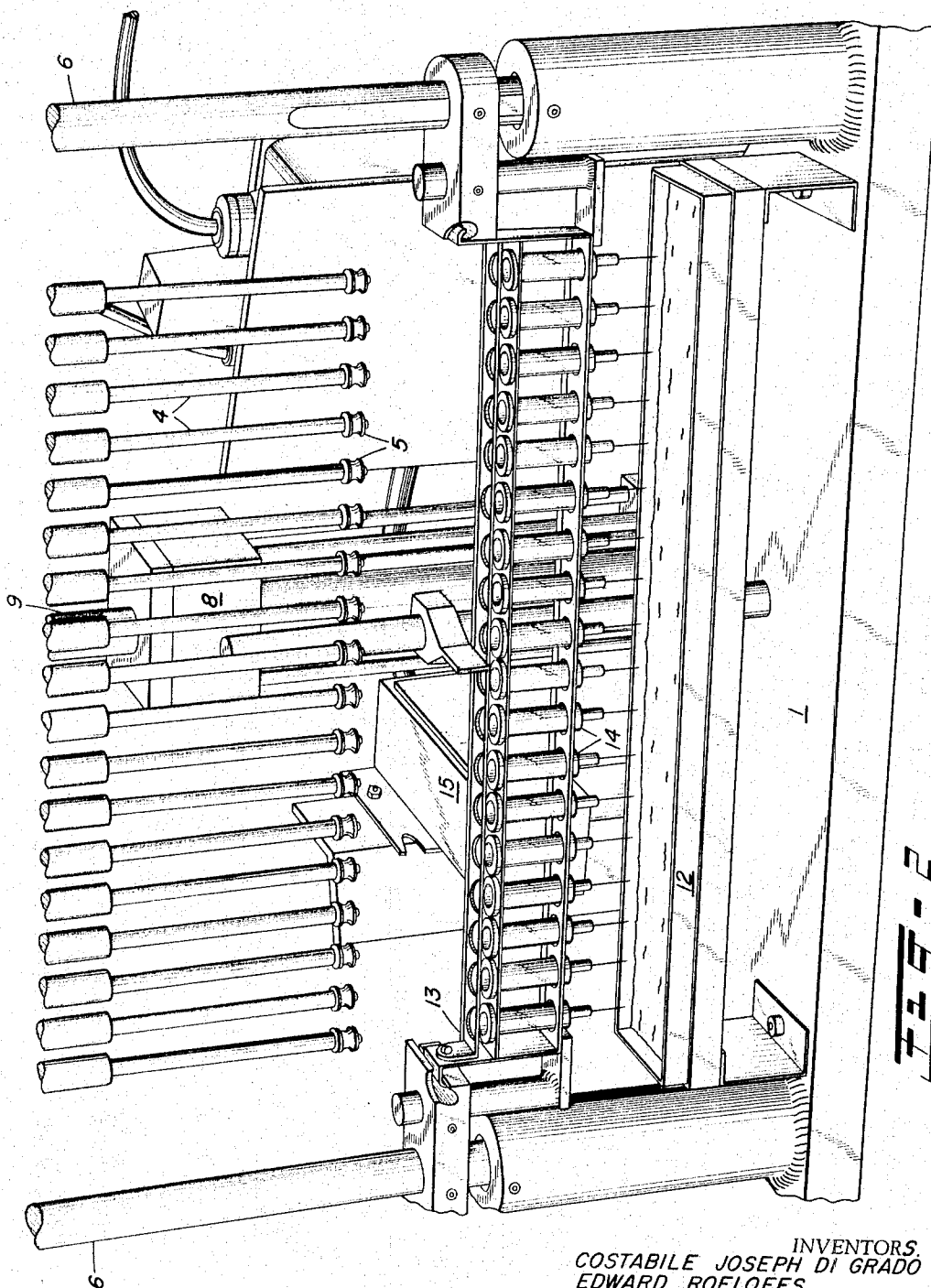
C. J. DI GRADO ET AL

3,335,700

APPARATUS FOR APPLYING SILICONE TO THE BARRELS OF SYRINGES

Filed May 26, 1966

4 Sheets-Sheet 2



INVENTORS:
COSTABILE JOSEPH DI GRADO
EDWARD ROELOFFS

BY

Norton S. Johnson

ATTORNEY

Aug. 15, 1967

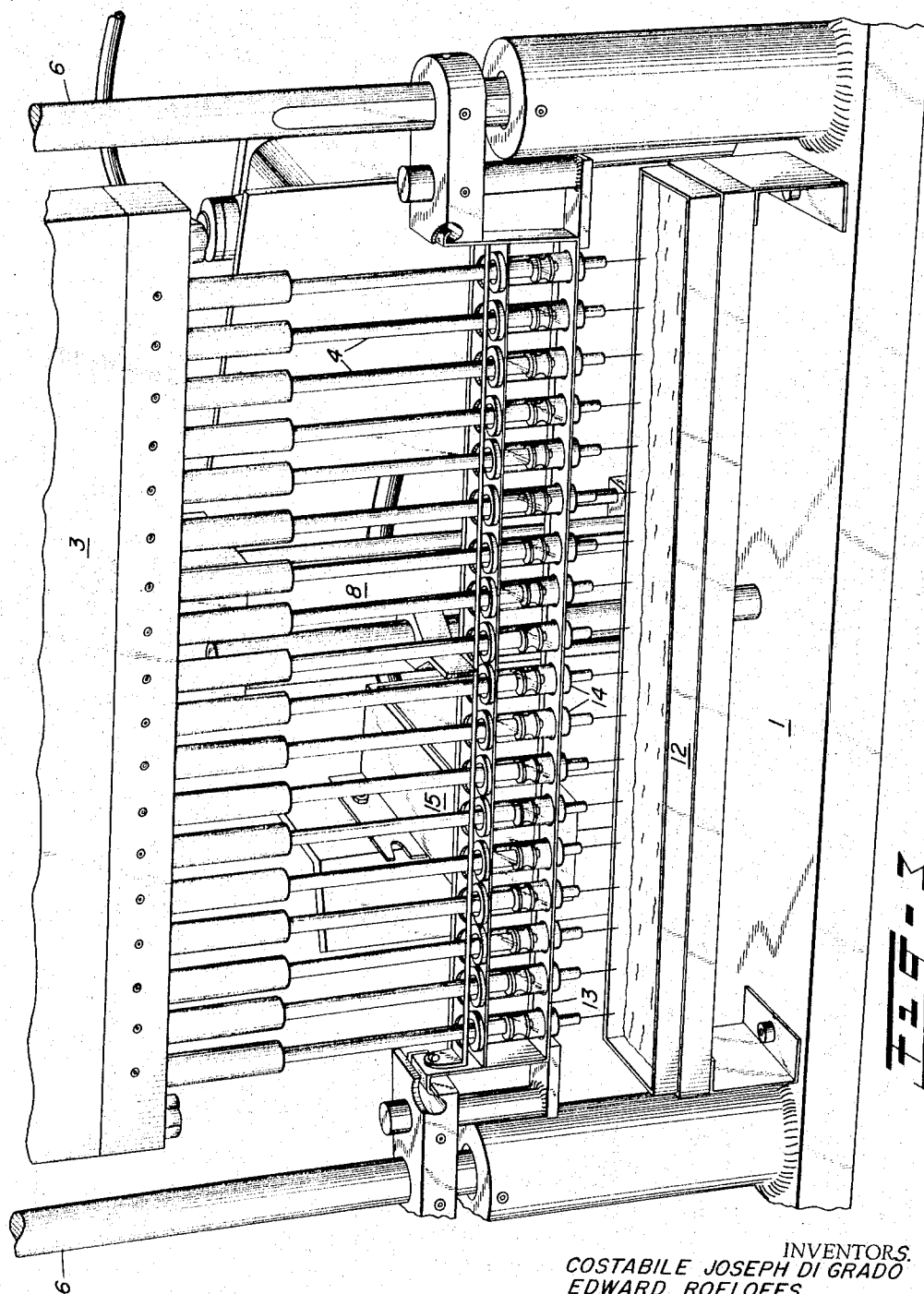
C. J. DI GRADO ET AL

3,335,700

APPARATUS FOR APPLYING SILICONE TO THE BARRELS OF SYRINGES

Filed May 26, 1966

4 Sheets-Sheet 3



INVENTORS:
COSTABILE JOSEPH DI GRADO
EDWARD ROELOFFS

BY

Norton S. Johnson

ATTORNEY

Aug. 15, 1967

C. J. DI GRADO ET AL

3,335,700

APPARATUS FOR APPLYING SILICONE TO THE BARRELS OF SYRINGES

Filed May 26, 1966

4 Sheets-Sheet 4

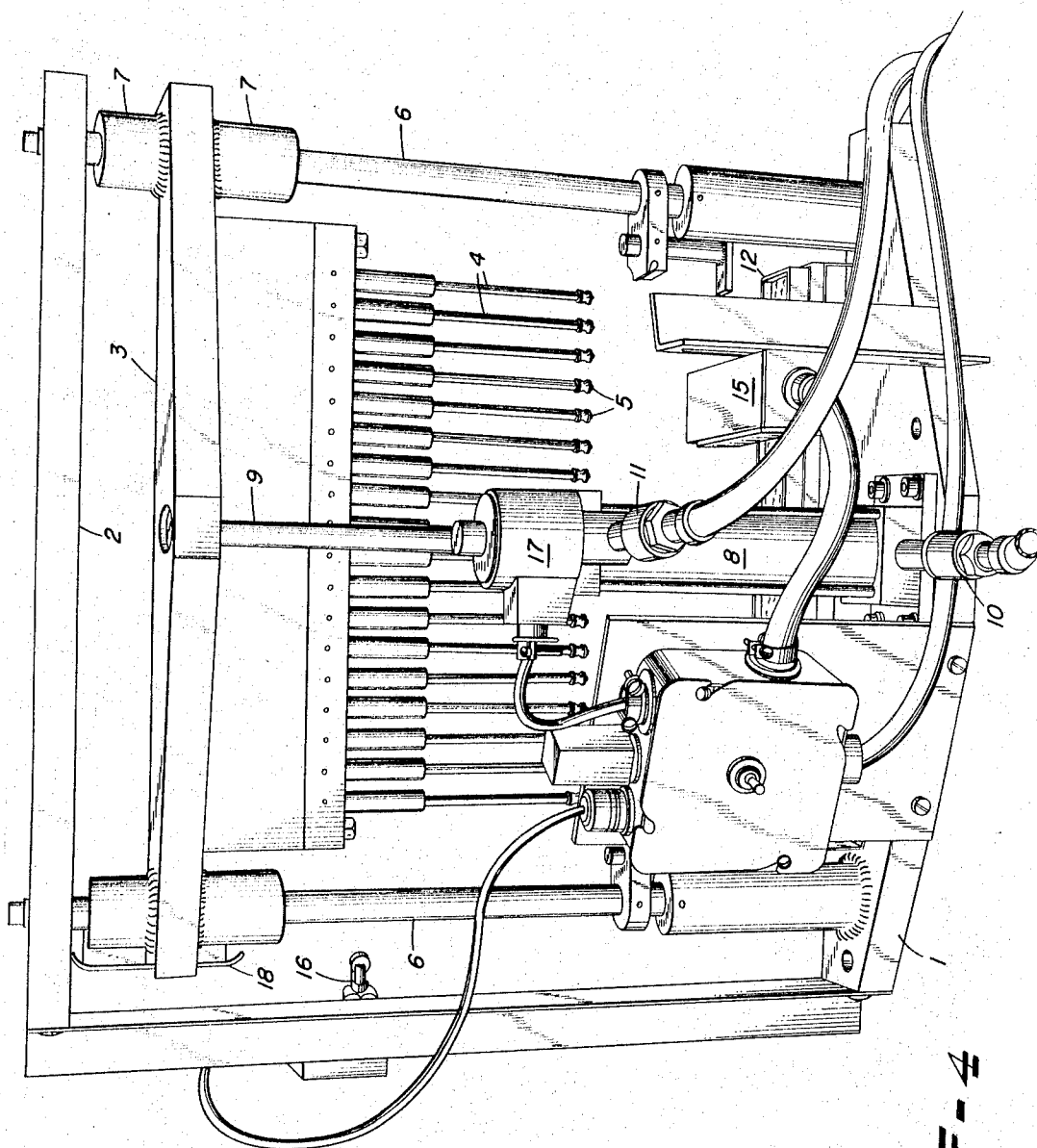


Fig. 4

INVENTORS.
COSTABILE JOSEPH DI GRADO
EDWARD ROELOFFS

BY

Norton S. Johnson

ATTORNEY

1

2

3,335,700

APPARATUS FOR APPLYING SILICONE TO THE BARRELS OF SYRINGES

Costabile Joseph Di Grado, Spring Valley, N.Y., and Edward Roeloffs, Wayne, N.J., assignors to American Cyanamid Company, Stamford, Conn., a corporation of Maine

Filed May 26, 1966, Ser. No. 553,219
4 Claims. (Cl. 118—215)

This invention relates to an improved machine for coating the interiors of containers such as the barrels for hypodermic syringes with a thin coating of lubricating or other liquid. More particularly the invention relates to an improved machine for coating the insides of barrels of disposable hypodermic syringes with a thin coating of a silicone.

The problem of labor costs of coating the insides of containers, such as containers for pharmaceutical liquids and more particularly barrels of hypodermic syringes, has assumed more serious proportions in late years with the rapidly decreasing prices of such containers. The problem is particularly acute with disposable hypodermic syringes which are increasingly used at the present time and where the cost must be kept very low so that the syringe can be thrown away after a single use or a few uses consecutively on patients at about the same time. Usually the coating is of a silicone solution which acts as an excellent lubricant for the syringe plunger. The silicone coating also is transparent and can be water repellent, so that when the syringe barrel is filled with the pharmaceutical liquid to be injected, the liquid level is readily visible.

It is standard procedure at the present to use a machine in which a number of rods are mounted in a metal frame with enlarged rubber tips which fit the inside of the syringe barrels. The frame can be raised hydraulically or pneumatically, a trough of silicone solution placed below the rods, the frame then lowered to wet the rubber tips of the rods with the silicone solution, raised, a tray of syringe barrels placed underneath and then the rods lowered down into the syringe barrels, transferring a coating of silicone from their rubber ends. Finally the frame is raised again, the tray of syringes removed, and the cycle repeated. Uniform coatings on the inside of the syringe barrels are produced, but the labor cost is undesirably high because an operator has to first introduce the silicone solution trough, actuate the machine to raise and lower the rods, then remove the trough and substitute a tray of syringe barrels, followed by a second lowering and rising of the rods. In other words, in a cycle there are two manual loading and unloading operations. This sets a very definite limit on the number of syringe barrels an operator can coat in an hour and of course is reflected in the cost of the operation.

According to the present invention the standard framework with rods and tips and pneumatic raising and lowering means is provided with two levels of tray or trough receiving members, the silicone solution trough being more or less continuously retained at a lower level and the trays of syringes introduced at a higher level. The syringe tray actuates mechanism which automatically determines a shorter stroke of the framework and rods than is needed for immersing the tips of the rods in the silicone solution. As a result the whole cycle, which has been described above for the prior art machine, is completed semi-automatically, requiring an operator only to load and unload the syringe barrel tray. In other words, the loading and unloading operations of the operator are cut in half, and this permits an almost

doubling of the output per operator hour, with a very marked reduction in cost. At the same time, the automatic controls assure that the rods make a stroke of the proper length in the syringe barrel, which prevents damage and assures perfect coating every time. We thus have the happy situation where increased production is obtained without any drawbacks even the uniformity of coating is retained. No compromise with quality is necessary and all of the advantages of the machine which have been used are retained and particulate contamination is actually reduced because the number of operation is reduced.

The invention will be described in greater detail in conjunction with the drawings, in which:

FIG. 1 is a front elevation of the machine with the rods in their lowest position, their tips being immersed in a trough of silicone solution;

FIG. 2 is a similar front elevation with the rods raised to their highest position and a tray of syringe barrels introduced at the higher level;

FIG. 3 is a front elevation with the rods at the end of their stroke in the syringe barrels, and

FIG. 4 is a rear elevation showing the rods in the raised position just before a tray of syringe barrels is introduced.

The machine is provided with the conventional base plate 1, outer framework 2, rod containing framework 3, with eighteen rods 4, each one having a rubber tip 5. Two guide rods 6 are provided on which bushings 7 of the rod carrying frame 3 slide. The framework 3 is raised or lowered by a pneumatic cylinder 8 and rod 9 which engages the rear of the framework 3. This is best seen in FIG. 4. Air pressure for the cylinder enters through the coupling 10 which is connected to a source of compressed air (not shown). This air causes the rod 9 and with it the framework 3 to raise. An air connection at 11, also connected to a source of compressed air, serves to lower the framework 3. Manually actuated valves control the introduction of air at 10 and 11 and are also not shown. So far the description is of the known machine of the prior art.

The improvement provided by the present invention will now be described in conjunction with operation of the machine in accordance with the invention. First, the framework 3 is raised, which is the same operation as in the machine of the prior art, and a trough containing a solution of a silicone 12 is placed at a lower level as shown in FIGS. 1 to 3. The placement of this trough also forms a part of the operation of the machine of the prior art, but in such a case this had to be repeated for each eighteen syringe barrels whereas under the improved operation of the present invention the trough with the silicone is only introduced once, as a matter of fact if desired it can be fixed, although for convenience in cleaning out it is preferably movable. Air is now introduced into the top of the cylinder 8 through the connection 11 and the framework 3 is lowered until the tips 5 of the rods are immersed in the silicone in the trough 12. This position is shown in FIG. 1. Now the framework 3 is raised again by introducing air through the opening 10 and assumes a position shown in FIG. 2. The operator loads a tray 13 with eighteen syringe barrels 14, as is shown in FIG. 2. This tray rests on a plate switch 15 which can be seen in FIG. 2 but is shown more clearly in FIG. 4. In the latter figure the tray with the syringe barrels is not present. In other words, FIG. 4 shows the machine just before the operator has loaded the tray 13 and FIG. 2 just after. The switch 15 may be actuated by the weight of the tray, but is preferably a proximity switch which is actuated by the proximity of the metal tray 13 which switches a microswitch 16 into the electric circuit. This switch is clearly shown in all of the figures.

The switch 16 actuates a three-way solenoid valve 17, which can be seen in FIG. 4, and this causes introduction of air through the opening 11, and the framework 3 moves down. An accurately adjusted depth gauge 18 is fastened to one side of the framework 3, and as it is lowered strikes the microswitch 16 at the point where the rod tips 5 are near the bottom of the syringe barrels. This causes the solenoid 17 to shut off air through the opening 11 and to bleed off the top of the cylinder by opening it to the atmosphere. The microswitch 16 thus prevents the frame 3 from descending too far and injuring the syringe barrels. FIG. 3 illustrates the machine at the moment when the microswitch 16 has just been tripped by the plate 18. The latter is of course adjustable in height, as is shown particularly in FIGS. 1 to 3, by a bolt 19 in a slot 20.

The actuation of the solenoid 17 by the switch 16 bleeds air out of the top of the cylinder and now air comes in through a conduit 10 and the framework 3 rises again to its top position. The operator removes the tray 13 with the syringe barrels which have received their coating and now the solenoid 17 and the limit switch 16 are cut out of circuit because there is no longer metal in proximity to the sensing switch 15.

The operator now again actuates the starting switch, the framework 3 descends to the position shown in FIG. 1, and the above cycle is repeated. It will be seen that the operator has to load only the trays 13 with syringe barrels and does not have to load the trough 13 as was formerly necessary. The latter remains at its lower level as is shown in FIGS. 2 and 3 and so eliminates half of the loading operations which the operator formerly had to perform. At the same time the machine operates just as accurately because the plate 18 assures that there will not be any overtravel of the framework 3, which in the machine of the prior art was assured by the fact that the trough 13 and the bottom of the syringe barrels were at the same level. In other words, the operation of the present invention automatically eliminates one of the loading operations which was previously necessary but does not in any way compromise the accuracy with which the machine operates.

The present invention has been described in conjunction with a pneumatically operated machine which was standard in the prior art. It is an advantage of the invention that a standard machine can very simply be modified by adding the elements 15, 16, 17 and 18 without otherwise redesigning or reconstructing the machine. This adds flexibility to the invention, which can be applied to existing machines as well as to new machines.

Pneumatic operation, which has been found to be reliable in the past, constitutes the preferred means for raising and lowering the framework carrying the rods. It should be understood, however, that the semi-automatic control features which constitute the present invention can be used with machines which employ other means for raising and lowering the framework with at-

tached rods. Thus, for example, hydraulic means may be used or mechanical raising and lowering means. However, pneumatic means are so satisfactory that they constitute the preferred embodiment of the present invention, and in a more specific aspect are therefore included.

We claim:

1. In a machine for coating the insides of containers with a liquid coating and which includes a framework carrying rods with ends of the same size as the inner diameter of the containers and capable of picking up liquid coating and applying it to the insides of the containers, the machine being provided with means for raising the framework with the rods and lowering it to submerge the ends of the rods in a liquid reservoir, the improvement which comprises,

(a) a support for a tray of containers at a level sufficiently above the reservoir so that no part of the containers are submerged therein,

(b) tray actuated switch means and a limit switch actuated thereby, means controlled by said limit switch for lowering the framework and rods and means carried by the framework and cooperating with the limit switch to stop lowering when the rods are at a predetermined level above that of the liquid in the reservoir and to cause the framework to rise again whereby when the tray of containers is not in place the framework can lower to immerse the ends of the rods in the reservoir and on the shorter lowering and raising of the framework is automatically effected.

2. A machine according to claim 1 in which the raising and lowering means for the framework are pneumatic means and are electrically controlled by a valve actuated by the limit switch.

3. A machine according to claim 2 in which the tray actuated means for switching in the limit switch is a metal proximity switch actuated by proximity of a metal tray.

4. A machine according to claim 3 in which the containers are hypodermic syringe barrels and the support for the tray is sufficiently above the level of liquid in the reservoir so that when the tray is in position syringe needles are not immersed in the liquid in the reservoir.

References Cited

UNITED STATES PATENTS

1,772,467	8/1930	Pym	118—243 X
2,348,233	5/1944	Turnock et al.	118—243 X
2,349,455	5/1944	Olsen	118—243 X
2,376,069	5/1945	Martin	118—243 X
2,376,069	5/1945	Martin	118—243 X
2,996,105	8/1961	Holderith	118—500 X
3,010,427	11/1961	Hautau	118—243
3,034,478	5/1962	Schwartz	118—263

CHARLES A. WILLMUTH, *Primary Examiner*.
R. I. SMITH, *Assistant Examiner*.