

Dec. 21, 1943.

F. G. STEWART

2,337,282

APPARATUS FOR MAKING MIRRORS

Filed Oct. 14, 1939

3 Sheets-Sheet 1

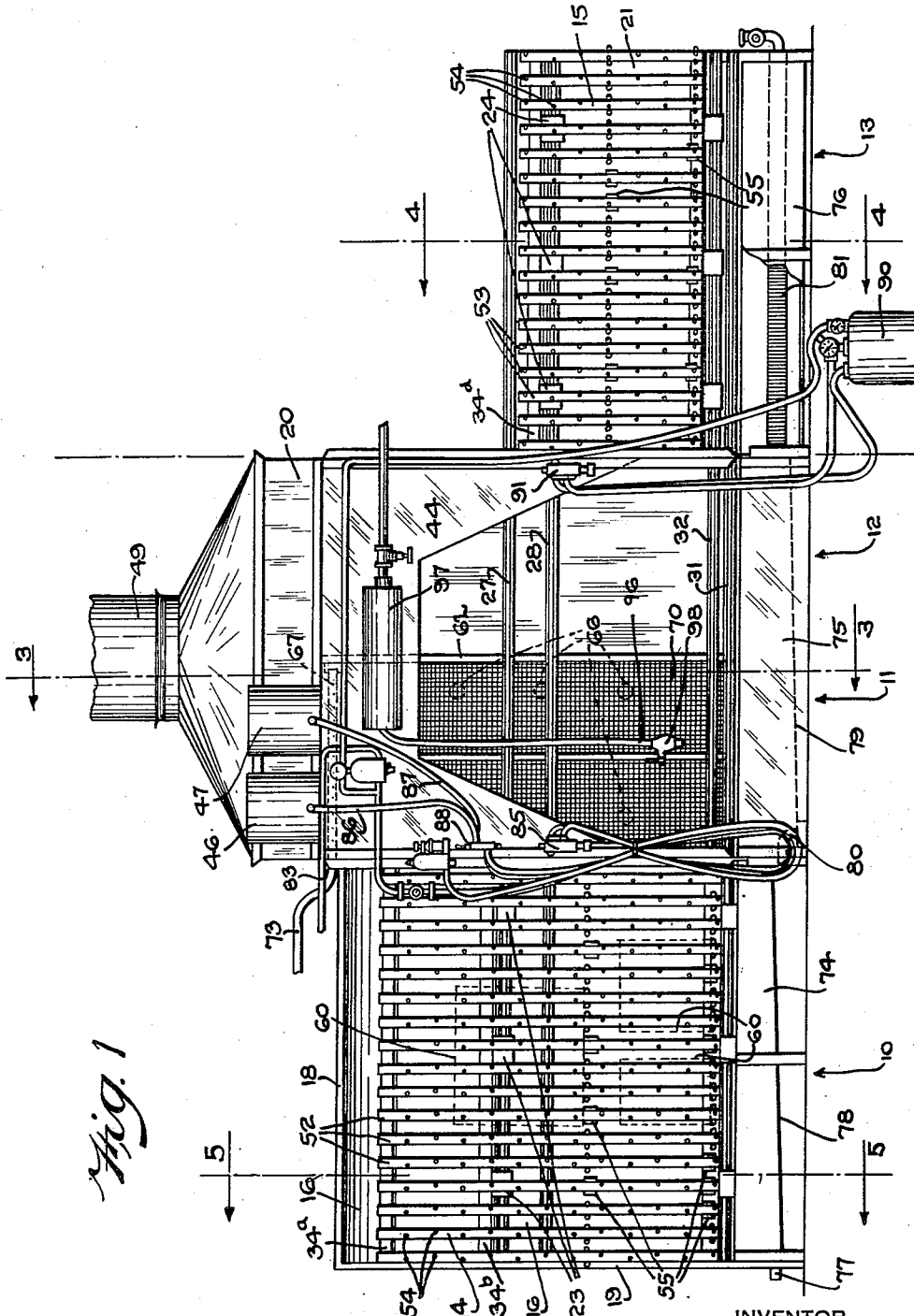


Fig. 1

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3 Sheets-Sheet 2

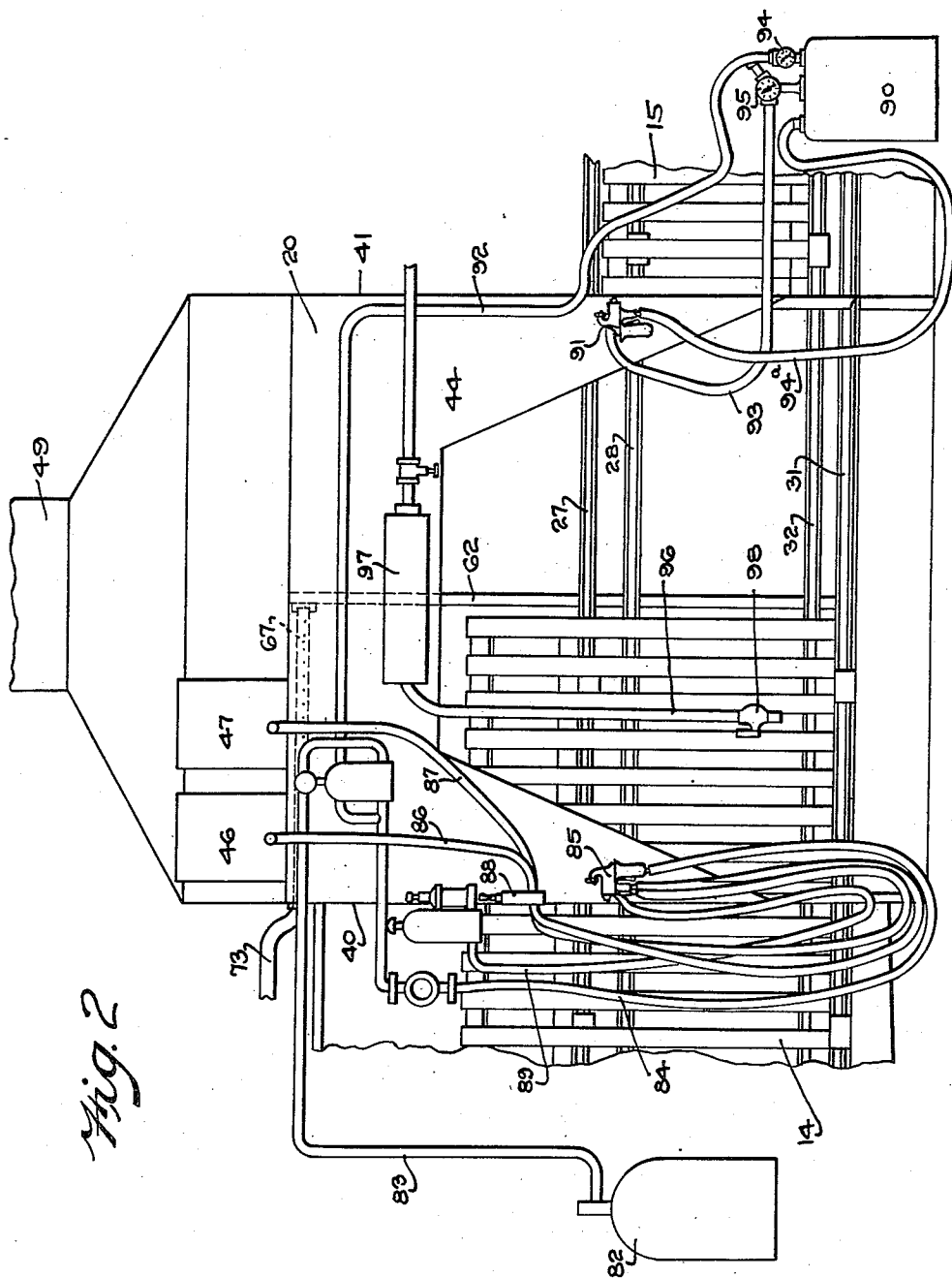


Fig. 2

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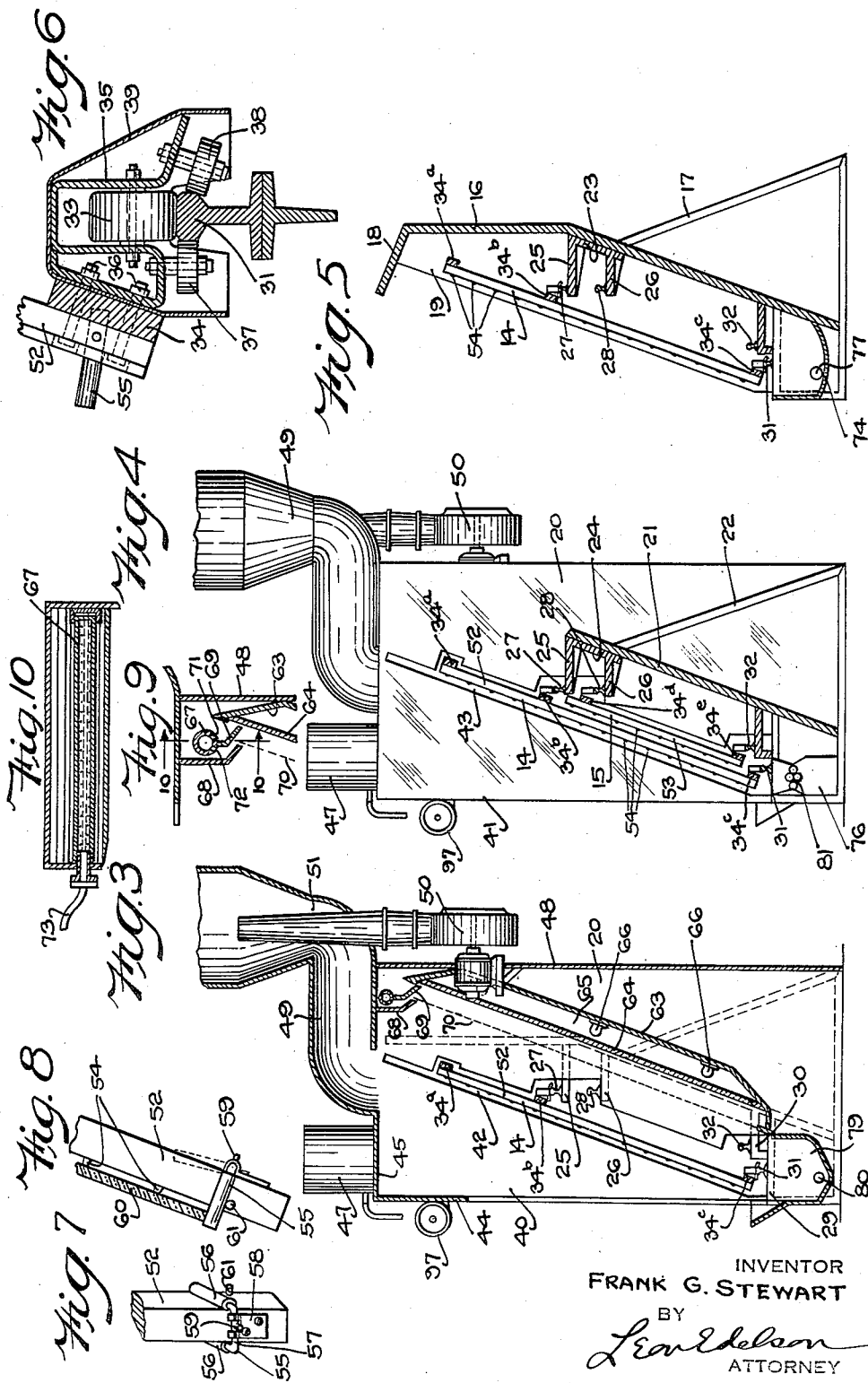
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3 Sheets-Sheet 3



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APPARATUS FOR MAKING MIRRORS

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Application October 14, 1939, Serial No. 299,489

6 Claims. (Cl. 91—12.4)

This invention relates generally to the art of mirror manufacturing and more particularly to an improved apparatus for facilitating the handling and treatment of the mirrors during the manufacture thereof, including, inter alia, the steps of washing the surface of the glass to be coated, of coating said surface with a reflecting film, of protectively coating said reflecting film and of drying the reflecting film and protective coatings, all without involving the necessity of manually handling the mirror from the time that it is placed in the apparatus as a plain sheet of glass until it is removed therefrom as a completed mirror.

Among the principal objects of the present invention is to provide an apparatus which is designed for use in conjunction with the so-called spray process of making mirrors wherein separately formed silver and reducing solutions are directed against the surface to be silvered in the form of atomized sprays or streams, such process being described, for example, in United States Letters Patent Nos. 1,574,544 and 1,583,268.

A further object of the invention is to provide an apparatus as aforesaid which is adapted to facilitate not only the silvering of the glass but which is also designed to facilitate the application of the usual protective coating for the delicate reflecting film, at the same time that it provides a convenient and efficient means for drying the respective coatings as they are applied.

Still other and important objects are to provide an apparatus which increases the speed of production of mirrors, which provides a visual check against the production of mirrors having defective reflecting films, which eliminates the necessity for manually handling each individual mirror during its course of manufacture, which eliminates the time-consuming, tedious and laborious task of wedge-leveling the glass in a horizontal plane as is necessary in the conventionally employed method of manufacturing mirrors, which eliminates the necessity of employing skilled operators in the manufacture of mirrors, which relieves the operator of the necessity for mixing his solutions preliminarily to pouring the same upon the glass, and finally which effects a very material saving in the floor space necessary to carry out the several procedural steps in the process of manufacturing a mirror.

Other objects and advantages of the invention will be apparent hereinafter, it being understood, of course, that the apparatus to be described in detail hereinafter and as defined in the ap-

ended claims is not limited in its application solely to the silvering of glass mirrors but instead is generally applicable for handling any type of flat body during the process of applying thereto a reflecting, decorative or protective coating of any suitable material. Also, it will be understood that the apparatus as shown in the accompanying drawings is merely illustrative of its type and that it may be modified in many of its constructional details without departing from the real spirit or general principles of the present invention.

In the accompanying drawings,

Figure 1 is a front elevational view of an apparatus construction in accordance with and embodying the principles of the present invention;

Figure 2 is an enlarged view of the central portion of the apparatus showing more particularly the layout of the several conduits leading from the sources of supply of the silvering solutions and the protective coating solution to the spray-gun applicators therefor;

Figure 3 is a sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1;

Figure 5 is a sectional view taken on the line 5—5 of Figure 1;

Figure 6 is a typical sectional view of the means for supporting the sliding racks upon their tracks;

Figures 7 and 8 show a front perspective and a side view, respectively, of a detail of the mirror-supporting rack;

Figure 9 is an enlarged sectional view of a detail in the silvering section of the apparatus; and

Figure 10 is a horizontal sectional view taken on the line 10—10 of Figure 9.

Referring now to the drawings, it will be observed that the apparatus as constructed in accordance with the present invention essentially comprises a plurality of sections 10, 11, 12 and 13 arranged in line and through which the mirror to be manufactured is adapted to be progressively shifted during its course of manufacture. The first section 10 of the apparatus is the loading and washing section, the section 11 is the section in which the reflecting film is sprayed onto the glass, the section 12 is the section in which the protective backing of paint is sprayed over the reflecting film and the section 13 is the drying and mirror unloading section, this drying section being employed for separately drying both the

reflecting film and the protective backing after each of the latter has been applied. Operatively associated with the several sections of the apparatus just mentioned are a pair of conveying racks 14 and 15 each of which is shiftable on tracks extending longitudinally across the fronts of the several sections 10 to 13, the said racks 14 and 15 being relatively so arranged that each rack may be progressively shifted from section to section of the apparatus independently of and without interference by the other rack. The advantage of this arrangement will be apparent more fully hereinafter.

As appears most clearly in Figures 1 and 5, the section 10 of the apparatus generally consists of a sheet metal backing 16 which is braced, as at 17, to support the same in generally upright position, the upper edge of this sheet metal back 16 being forwardly turned, as at 18, and the left-hand extremity thereof being provided with an end plate 19. The right-hand extremity of the sheet metal backing 16 of the loading section 10 of the apparatus abuts against and is secured to the left-hand side wall of a booth which houses the spraying sections 11 and 12 of the apparatus, this booth being designated generally by the reference numeral 20. Projecting laterally from the right-hand wall of this booth is the sheet metal backing 21 for the section 13 of the apparatus, this backing 21 being braced, as at 22, to support it in the position shown most clearly in Figure 4. It will be observed that the lower inclined portion of the sheet metal backing 16 of section 10 of the apparatus lies in a common plane with the sheet metal backing 21 of the section 13 of the apparatus. Secured to the sheet metal backing 16 at longitudinally spaced points thereof are a plurality of upper bracket members 23, while secured to the sheet metal backing 21 are a plurality of longitudinally spaced brackets 24. The brackets 23 and 24 each include a pair of vertically spaced flanges 25 and 26 respectively serving as vertically spaced supports for a pair of longitudinally extending tracks 27 and 28 arranged in vertically spaced relation. The track 27 serves as the upper track for the longitudinally shiftable carriage 14, while the track 28 serves as the upper track for the longitudinally shiftable carriage 15.

Arranged adjacent the lower edges of the sheet metal backings 16 and 21 are suitable supports 29 and 30 upon which are respectively supported a pair of longitudinally extending tracks 31 and 32, these latter constituting respectively the lower tracks for the longitudinally slidable conveying racks 14 and 15. As appears most clearly in Figures 3 to 5, inclusive, the longitudinally extending tracks 27 and 31 comprise the pair of tracks along which the conveyor rack 14 is movable from section to section of the apparatus, while the longitudinally extending tracks 28 and 32 comprise the pair of tracks along which the second conveyor rack 15 is movable. It will be observed that the pairs of tracks 27—31 and 28—32 are relatively so arranged as to support the conveyor racks 14 and 15 in planes which are inclined with respect to the vertical and which are disposed in such spaced parallel relation as to permit the said conveyor racks to be shifted longitudinally along their respective tracks without interfering one with the other. Thus, both the conveyor rack 14 and the conveyor rack 15 may be positioned in the loading section 10 of the apparatus at the same time or, as the rack 14 is shifted in one direction through

the several sections of the apparatus, the conveyor rack 15 may be shifted in the opposite direction. In actual operation, the two conveyor racks 14 and 15 are so employed that one supplements the other to increase the productive capacity of the apparatus, the arrangement being such that when one of the racks has progressed through the several sections of the apparatus until it reaches the drying section 13 where it must remain for an interval of time sufficient to effect the complete drying of the processed mirrors supported on said rack, the remaining rack is available to receive a further supply of mirrors for processing in the apparatus commencing with the initial operation of loading the rack in the section 10 of the apparatus.

In order to insure ease of movement of the conveying racks along their supporting tracks even when heavily loaded with a full complement of mirrors to be produced, each of the said racks is provided with upper and lower sets of rollers 33 such as is best shown in Figure 6. Referring more particularly to this figure, it will be observed that longitudinally extending upper and lower rails 34 of each rack are provided at longitudinally spaced points thereof with brackets 35 which are secured to the rails by bolts 36 and which each serve as supports for the main roller wheel 33 which rests upon the top of the corresponding track and for a pair of laterally disposed roller guide wheels 37 and 38 which respectively engage opposite sides of the track to prevent lateral displacement of the main supporting roller 36 from said track. Preferably, a shield 39 extends longitudinally along the conveyor rack in secured relation to each of the longitudinally extending rails 34 thereof to cover and protect the rollers 33, 37 and 38 against water and other solutions used in the processing of the mirrors.

At this point, it will be observed that the opposite side walls 40 and 41 of the spray booth 20 are respectively cut out, as at 42 and 43, (see Figures 3 and 4) to permit the free passage therethrough of the conveyor racks 14 and 15 during the course of their progress from section 10 to section 13, and vice versa, of the apparatus. The openings 42 and 43 thus provided in the side walls 40 and 41 of the spray booth are each of a shape and dimension ample to also accommodate the pairs of conveyor tracks 27—31 and 28—32 which extend across the entire extent of the apparatus. The spray booth 20 is provided with a frontal shield or hood 44 disposed substantially in advance of the line traversed by the upper edge of the conveyor rack 14, the top of the spray booth being provided with a horizontally disposed shelf 45 upon which is supported a pair of solution receptacles 46 and 47. The spray booth is preferably provided with a rear enclosing back 48 while the top thereof is provided with an exhaust flue 49 with which is operatively associated a motor operated blower unit 50 which induces a draft in the immediate vicinity of the restricted area 51 of the exhaust flue to draw out of the spray booth all noxious fumes and vapors.

Referring now more particularly to the conveyor racks 14 and 15, it will be observed that while the two racks are substantially identical in construction and are supported in substantially identical manner for sliding movement along the pairs of tracks 27—31 and 28—32, the conveyor rack 14 is substantially larger in size than the conveyor rack 15. This provides for a

more compact construction of apparatus and yet provides the apparatus with sufficient capacity for all general purposes, the larger conveyor 14 being suitable for the handling of large-size plate glass mirrors while the smaller rack may generally be used for the smaller size mirrors. As has previously been indicated, each of these racks include a plurality of vertically spaced longitudinally extending rails 34. The larger rack 14 includes three such rails, designated 34a, 34b and 34c, while the smaller rack 15 includes only two such rails, designated 34c and 34d (see Figures 3, 4 and 5).

Secured to the rails 34a, 34b and 34c of the conveyor rack 14 are a plurality of slats 52 arranged in longitudinally spaced parallel relation, these slats being disposed, of course, in a common flat plane inclined with respect to the vertical. Similarly, in the case of the conveyor rack 15, a plurality of slats 53 extend across the rails 34d and 34e thereof and are secured thereto in longitudinally spaced parallel relation, the slats 53 being all disposed in a common plane inclined with respect to the vertical. As has been previously indicated, the inclined plane of the slats 53 parallels the plane of the slats 52 but is spaced rearwardly thereof a sufficient distance to permit the conveyor racks 14 and 15 to freely pass one another without interference. Preferably, the forward faces of the slats 52 of the conveyor 14 and the slats 53 of the conveyor 15 are equipped with rubber knobs or buttons 54 which engage the rear surface of the flat glass members which may be placed upon the conveyor racks for processing in the apparatus, these rubber elements 54 thus serving to cushion and protect the glass against breakage due to shock or any other injurious vibrations to which the glass may be subjected while progressing through the apparatus. It will be understood, of course, that the conveyor racks 14 and 15 are each adapted to receive one or more flat plates for conveyance through the apparatus for processing, these plates being disposed flatwise against the inclined front or outer surfaces of the conveyor racks. In order to support the plates to be processed in proper position upon the racks, the several slats 52 and 53 thereof are each provided with one or more supporting elements 55 of the character best shown in Figures 7 and 8. These elements are generally of U shape having laterally spaced rubber covered arms 56—56 each of a length somewhat greater than the depth of the rack 52 with which the element 55 is associated. The closed end 57 of the element 55 extends laterally across the rear face of the rack 52 and is pivotally supported thereon by a suitable bracket 58. Preferably, the pivot portion 57 of each supporting element 55 is provided with a projection 59 which serves as a stop to retain the element 55 in the inoperative position as shown in dotted line in Figure 8. In its operative position, the supporting element 55 is swung into the full-line position shown in Figure 8 so that the forward extremities of the rubber covered arms 56—56 project forwardly of the front plane of the conveyor rack to provide rests which are engaged by the lower edges of the plates supported upon the conveyor rack. Figure 8 shows a portion of one of such plates, designated by the reference numeral 60 operatively supported in position by the element 55. Laterally extending pins 61 projecting from opposite sides of each slat 52 engage the rubber covered arms 56—56 of the

element 55 and retain the latter in plate supporting position.

It will be understood, of course, that as many of the slats 52 and 53 as desired may be provided with the plate supporting elements 55, it being preferable to provide each slat with at least one of said elements. Also, it will be understood that the elements 55 are respectively secured to the slats of each conveyor rack in such manner as to provide one or more horizontally extending rows of such supporting elements, whereby two or more of said elements in any one row thereof may provide adequate support for a plate of any size to be processed in the apparatus. In the particular apparatus shown in Figure 1, each of the conveyor racks 52 and 53 is provided with two horizontal rows of the plate supporting elements 55, one row being provided immediately adjacent the bottom edge of each conveyor rack and the other row of said plate supporting element being disposed at a somewhat higher elevation. Figure 1 shows in dotted line a plurality of plates to be processed supported upon the conveying racks 14 and 15 by the plate supporting elements 55 thereof.

Referring now to that part of the apparatus which includes the spray booth 20, it will be noted that this booth houses the section 11 in which the reflecting film is sprayed onto the glass and the section 12 in which the protective backing of paint is sprayed over the reflecting film. Preferably, these spraying sections 11 and 12 are separated from one another by a vertically extending partition 62 (see Figures 1 and 2). As appears most clearly in Figure 3, the spray booth 20 is provided with an inner rear wall 63 which extends across the width of the booth from side wall to side wall thereof. In the section 11 of the spray booth 20, that is, the section which is confined between the side wall 40 of the booth and the central partition 62 thereof, the inner back wall 63 thereof is fitted with a transparent window or wall 64 formed preferably of glass. This glass wall 64 is upwardly and rearwardly inclined, as best shown in Figure 3, and together with the back wall 63 forms a chamber 65 within which is disposed a plurality of lamps 66. When these lamps are illumined, the light emanating therefrom is projected through the glass window 64 and so provides an illuminated background for the mirrors while the latter are being processed in the silvering spray sections 11 of the apparatus. As also most clearly appears in Figures 1, 3, 9 and 10, the spraying section 11 of the apparatus is provided in the top thereof with a longitudinally extending perforated conduit 67 and with associated baffles 68 and 69 for spraying water in sheet form over the surface of the glass window 64 and over the surface of a relatively fine gauge metallic screen 70 disposed in advance of and in spaced parallel relation with respect to the said glass window 64. As appears most clearly in Figure 9, the water conduit 67 is provided with a pair of longitudinally extending rows of perforations 71 and 72 through which the water is discharged from said conduit 67 in the form of sprayed attenuated sheets onto the inclined surfaces of the glass window 64 and the screen 70. The perforated conduit 67 is supplied with water through a suitable supply pipe 73 (see Figures 1 and 10) and thus the window 64 and the screen 70 during the operation of the apparatus are each completely covered by a continuously flowing stream of water, the purpose

of which will be apparent immediately herein-after.

Provided at the bottom of the apparatus are a series of longitudinally extending troughs 74, 75 and 76. The trough 75 extends lengthwise across the loading section 10 of the apparatus and is provided with a discharge outlet 77 through which any water accumulating in said trough may be discharged to waste, it being noted that the bottom of the trough is inclined, as at 76 (see Figure 1), to facilitate gravity discharge of any water accumulated therein. The trough 75 extends across the bottom of the spray booth 20 and is also provided with an inclined bottom 79 to facilitate discharge of any solutions accumulating therein, such discharge being effected by way of a suitable discharge outlet 80. The trough 76 extends across the bottom of the section 13 of the apparatus and houses therein a heating unit 81 which is preferably in the form of a finned conduit adapted to be supplied with steam as the heat medium. The heat radiated from this finned tube is directed upwardly through the open end of the trough and courses about the processed mirrors supported upon the conveyor rack disposed above such source of drying heat in such manner as to quickly dry the coatings applied over the surface of the mirrors undergoing process in the apparatus. Of course, any other suitable type of heating and drying means may be employed, as for example, means for circulating or blowing heated air over the surface to be dried.

Operatively associated with the apparatus as above described is the various equipment for applying the several coatings upon the articles to be processed. As appears most clearly in Figures 1 and 2, the apparatus preferably includes a main source of compressed air supply, designated generally by the reference numeral 82 from which compressed air is supplied by way of the conduits 83 and 84 to a spray gun 85. This spray gun is preferably of a dual type adapted to simultaneously spray separate streams of two separate solutions onto the surface of the glass to be coated with a reflecting film, the streams being so directed as to be intimately mixed in the immediate vicinity of the surface to be coated. The separate solutions are normally contained in the receptacles 46 and 47 above referred to and are applied to the spray gun by way of the flexible conduits 86 and 87 respectively. It will be understood, of course, that any suitable spraying equipment may be employed, but preferably a spray gun apparatus of the type disclosed in the pending application of Austin H. Downs, Serial No. 279,613, filed June 17, 1939, is used. In this latter type of spraying apparatus, the valves 88 controlling the discharge of the solutions from the receptacles 46 and 47 to the spraying head are preferably actuated by air pressure delivered to the valve actuated mechanism upon operation of the spray gun 85 by way of the flexible conduit 89.

For use in protectively coating the reflecting film applied to the surface of the glass is a paint spray apparatus shown on the right-hand side of Figure 2 which includes a supply tank 90 containing paint or other material for protectively coating the delicate reflecting film of the mirror and the spray gun 91 by means of which this protective material is sprayed over the surface to be protectively coated. The supply of compressed air for the tank 90 and for operating the spray gun 91 is the same as for the spraying apparatus

85, namely, the air compressor unit 82, the air under suitable pressure being supplied to the tank 90 by way of the conduit 92 and to the gun 91 by way of the by-pass 93. Suitable pressure reducers 94 and 95 are preferably inserted in the lines to insure the supply of air to the tank 90 and to the gun 91 under suitable predetermined fixed pressures, the protective coating material being delivered to the spray gun nozzle from the tank 90 by way of a flexible conduit 94^a. As in the case of the spraying equipment 85 et seq., the paint spraying equipment 90, 91 et seq., may be of any desired type capable of satisfactorily spraying a coating of paint or other protective material over the exposed surface of the reflecting film.

In addition to the foregoing, the apparatus of the present invention includes provision for washing the surface of the article to be processed both before and after it has been coated with the reflecting film. Thus, as appears most clearly in Figures 1 and 2, a flexible hose 96 connected to a suitable supply of water, preferably distilled, is provided at a convenient point of the apparatus so that the surfaces of the articles to be processed may be washed immediately after the articles have been loaded upon the conveyor rack in the loading section 13 of the apparatus or after the reflecting film has been applied in the section 11 of the apparatus. Preferably, the distilled water is supplied either heated or under pressure for most effective washing or rinsing. In Figures 1 and 2, the apparatus is shown equipped with a heater 97 for heating the rinse water delivered by way of the hose 96 and the nozzle 98.

In the use of the apparatus of the present invention, the articles to be processed generally will be in the form of flat plates of glass or other such material, one or both surfaces of which are to be coated with suitable materials such as are adapted to provide reflecting, decorative or protective finishes over the surfaces to be processed. Assuming that the apparatus is to be employed for the purpose of producing glass mirrors having silver reflecting films, the glass plates of which the mirrors are to be formed are initially loaded upon one or the other of the conveying racks 14 or 15 which is preliminarily located in the loading position assumed by the rack 14 in Figure 1. As has previously been indicated, as many pieces of glass may be loaded upon the conveyor as is practicable for the conveyor to conveniently support. If the glass plates to be silvered are relatively small in size, two rows thereof may be supported upon the two horizontally extending rows of supporting elements 55, which latter, of course, are turned outwardly as shown in Figure 8 to engage the lower edges of the glass plates. On the other hand, if a single large plate is to be silvered, the upper row of supporting elements 55 may be turned back into the dotted line positions as shown in Figure 8 so as to provide a single row of outwardly turned supporting elements along the bottom of the conveyor for supporting such relatively large pieces of glass. Having positioned the glass plate or plates upon the conveyor 14 and while the latter is in its initial position in the section 10 of the apparatus as shown in Figure 1, the surface of the glass may be washed or rinsed with distilled water supplied by means of the hose 96 to clean the surface or surfaces to be treated of any extraneous matter such as might interfere with the silvering operation. Following this step of cleansing the glass surface, the latter is sensi-

tized with a tin chloride solution which may be sponged over the surface of the glass, following which the glass is again flushed or rinsed with water supplied by way of the flexible hose 96.

The conveyor with the glass plates carried thereby is then shifted along its longitudinally extending supporting tracks toward the intermediate section 11 of the apparatus so as to present the surfaces to be silvered well within said latter section of the apparatus. When the positioned glass plates supported by the conveyor 14 are thus disposed within the silver spraying section 11 of the apparatus, the operation of silvering the surface is then performed by spraying the silvering solutions directly upon the previously sensitized surfaces of the glass. The silvering solutions employed in this step are normally contained in the overhead receptacles 46 and 47 from whence they are supplied by gravity or otherwise to the spray gun 85, these solutions being atomized under suitable air pressure to produce atomized streams of the two solutions which intimately mix together and react in the immediate vicinity of the glass surface to deposit thereon a film of metallic silver. Obviously, any suitable silvering solutions may be employed, the usual solutions being a solution of silver ammonio nitrate contained in the receptacle 46 and a suitable reducing solution therefor contained in the receptacle 47. During this step of silvering the glass surface, water is supplied to the spray tube 67 in the head of the silver spray section 11 by way of the conduit 73 to provide continuously flowing films of water over the inclined surfaces of the glass window 64 and the metallic screen 70. By so flushing water over the screen 70, which is forwardly spaced from the glass window 10, the water flowing on said screen serves as an effective shield which prevents the silvering solutions from being projected onto the surface of the glass window 64. Thus, the latter is kept free of any deposit of silver and is maintained transparent to light and, therefore, permits the rays of light emanating from the lamps 66 to be projected upon the rear surface of the glass being silvered. As the deposit of metallic silver sprayed upon the glass plates becomes more and more dense, the light from the battery of lamps 66 becomes less and less visible so that when the coating on the glass plate becomes completely opaque the operator knows that an adequate silver coating has been applied. The battery of lamps 66 thus provides a visual check by means of which the operator may determine at a glance whether or not the glass plate being processed has acquired a sufficient deposit of metallic silver such as requisite to form a satisfactory mirror. The excess silvering solutions, of course, pass freely off the surface of the glass being treated and is discharged into the trough 75 from whence it may be recovered for subsequent reclamation of the silver contained therein. The water flowing downwardly from the screen 70 also assists in the quick removal and discharge into the trough 75 of all parts of the silvering solutions which are projected outside the edges of the glass plates being silvered onto said screen.

Having completed the silver step and without moving the conveyor from its position within the silver spray section 11 of the apparatus, the silvered surfaces are again rinsed with distilled water supplied by way of the hose 96 and when the silvered surfaces have thus been completely and thoroughly washed, the conveyor supporting the glass plates so silvered and washed is then

shifted into the drying section 13 of the apparatus. While in this latter section, the glass plates are subjected to the drying effect of the heat radiated from the heater 81 and when all of the plates are thus dried the conveyor is shifted back into the paint spraying section 12 of the booth 20. While in this latter section, the silvered surface of the glass plates are subjected to the application of a coating of paint or other protective material which is sprayed thereon by means of the spray gun 91. Having completed the application of the protective coating on all of the silvered plates of glass supported on the conveyor rack, the latter is again shifted back into the drying section 13 of the apparatus and permitted to remain there until the protective coatings are fairly dry. The processing of the mirrors is then complete and the completed mirrors may then be bodily removed from the conveyor rack.

In the foregoing description of the use of the apparatus, it was assumed that only one of the racks, namely, the conveyor rack 14, was in operation. When it is desired to increase the capacity of the apparatus, the second rack 15 may be employed in conjunction with the rack 14 in such manner that while one of the racks is being employed to handle one batch of mirrors to be processed, the other rack may likewise be employed to handle a second batch. Thus, while mirrors carried by the conveyor 14 are in the drying section of the apparatus, the second conveyor 15 carrying its complement of mirrors may be in the section 11 of the apparatus so that as one batch of mirrors is being dried, a second batch of mirrors may be undergoing the silvering process or may be subject to other steps in the processing of the mirrors.

It will be understood, of course, that the apparatus is not limited in its use solely to the silvering of mirrors but instead may be employed generally for the handling of glass or other flat sheets of material subject to successive treatment steps and which require the shifting of one or more of such plates through successive treatment stages. Also, it will be understood that the apparatus may be modified in many respects, without departing from the real spirit or general principles of the invention and, accordingly, it is intended to claim the invention broadly, as well as specifically, as indicated in the appended claims.

What is claimed as new and useful is:

1. An apparatus for handling mirrors during the manufacture thereof comprising, in combination, a coating section and a drying section arranged in tandem relation in each of which the mirror is adapted to be positioned to receive the prescribed course of treatment, conveying rack tracks extending commonly through said sections, and a conveyor for the mirrors to be processed supported upon and shiftable in either direction along said tracks to present said mirrors in one or the other of said sections for treatment therein and to return them to either of said sections after removal therefrom for further treatment.

2. An apparatus for handling mirrors during the manufacture thereof comprising, in combination, a coating section and a drying section arranged in tandem relation in each of which the mirror is adapted to be positioned to receive the prescribed course of treatment, conveying rack tracks extending commonly through said sections, and a conveyor for the mirrors to be processed supported upon and shiftable in either direction

along said tracks to present said mirrors in one or the other of said sections for treatment therein and to return them to either of said sections after removal therefrom for further treatment, said tracks being so disposed as to support said conveying track in inclined position with respect to the vertical and said conveying rack being provided with means for supporting the mirrors to be processed flatwise against the inclined surface thereof.

3. An apparatus of the character described comprising, in combination, a longitudinally extending track system for a conveyor, a conveyor operatively associated with and adapted to be shifted longitudinally in either direction along said track system, said conveyor being characterized in that it is in the form of a slatted rack adapted to support upon the surface thereof one or more flat bodies to be treated, said track system and said rack being relatively so arranged as to maintain the latter inclined with respect to the vertical, and a coating section and a drying section spaced longitudinally along said track system, said rack being movable along said track system to present the bodies supported by the said rack in one or the other of said sections for treatment therein and for returning them thereto for further treatment.

4. An apparatus of the character described comprising, in combination, a longitudinally extending track system, a conveying rack for supporting bodies to be treated operatively associated with and shiftable longitudinally along said track system in either direction, a spray booth disposed at an intermediate point in the length of said track system and in which said bodies are subjected to a plurality of spray treatments, said conveying rack being adapted to be shifted along said track system into and out of said spray booth and returned thereto for further treatment, means associated with said spray booth for coating the surfaces of said bodies supported by said conveying rack within said spray

booth with a sprayable material, and a drying section arranged exteriorly of said spray booth for receiving said sprayed bodies from the said spray booth after each spray treatment therein and while still supported upon said conveying rack, said track system along which said conveying rack is shiftable being extended through said drying section.

5. An apparatus of the character described comprising, in combination, a longitudinally extending track system, a conveying rack shiftable longitudinally along said track system in either direction and adapted to support one or more plates to be surface coated with sprayable material, said conveying rack being adapted to support said plates with the surfaces thereof to be treated inclined with respect to the vertical, and a spray booth disposed at an intermediate point in the length of said track system, and in which said plates are subjected to a plurality of spray treatments, said conveying rack being movable along said track system to carry the plates into and out of said spray booth and for returning them thereto for further treatment.

6. In an apparatus for processing mirrors, a plurality of stations in each of which a separate step in the process of making a mirror is adapted to be performed, a track system extending commonly through said stations, a conveying rack for the mirrors to be processed operatively associated with and adapted to be shifted longitudinally in either direction along said track system to successively present said mirrors in said several stations for treatment therein and for returning them to certain stations for further treatment, said track system being arranged to support said conveying rack and the mirrors carried thereby in a plane sufficiently inclined with respect to the vertical as to facilitate rapid discharge by gravity from the surfaces of said mirrors of flowable surface-treating materials sprayed upon the exposed surfaces of the mirrors.

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