

Dec. 1, 1959

R. B. WAY ET AL
MULTICOLOR PAINTING MACHINE

2,915,037

Filed July 18, 1955

7 Sheets-Sheet 1

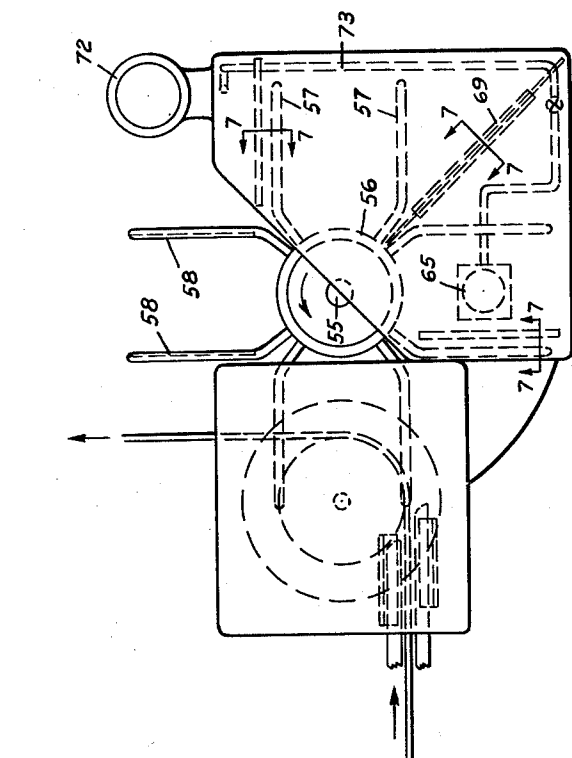


FIG. 2

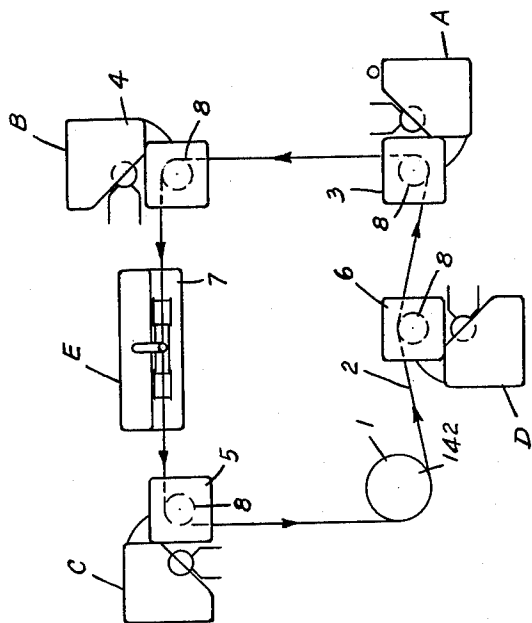


FIG. 1

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FIG. 3

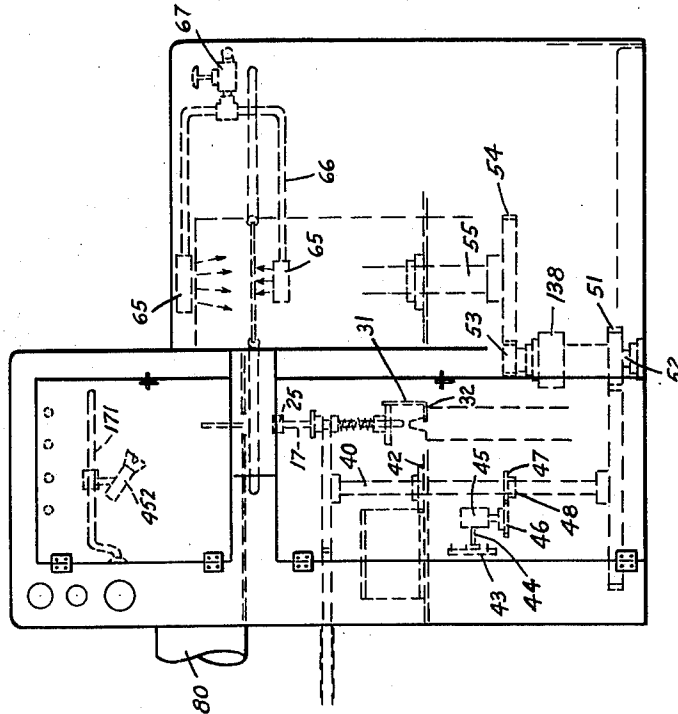
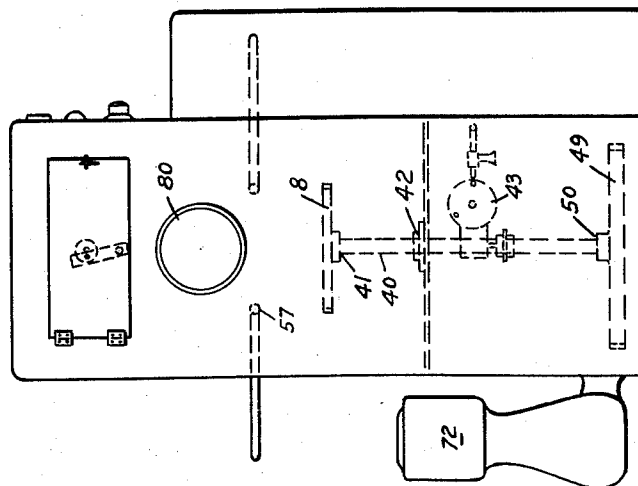


FIG. 4



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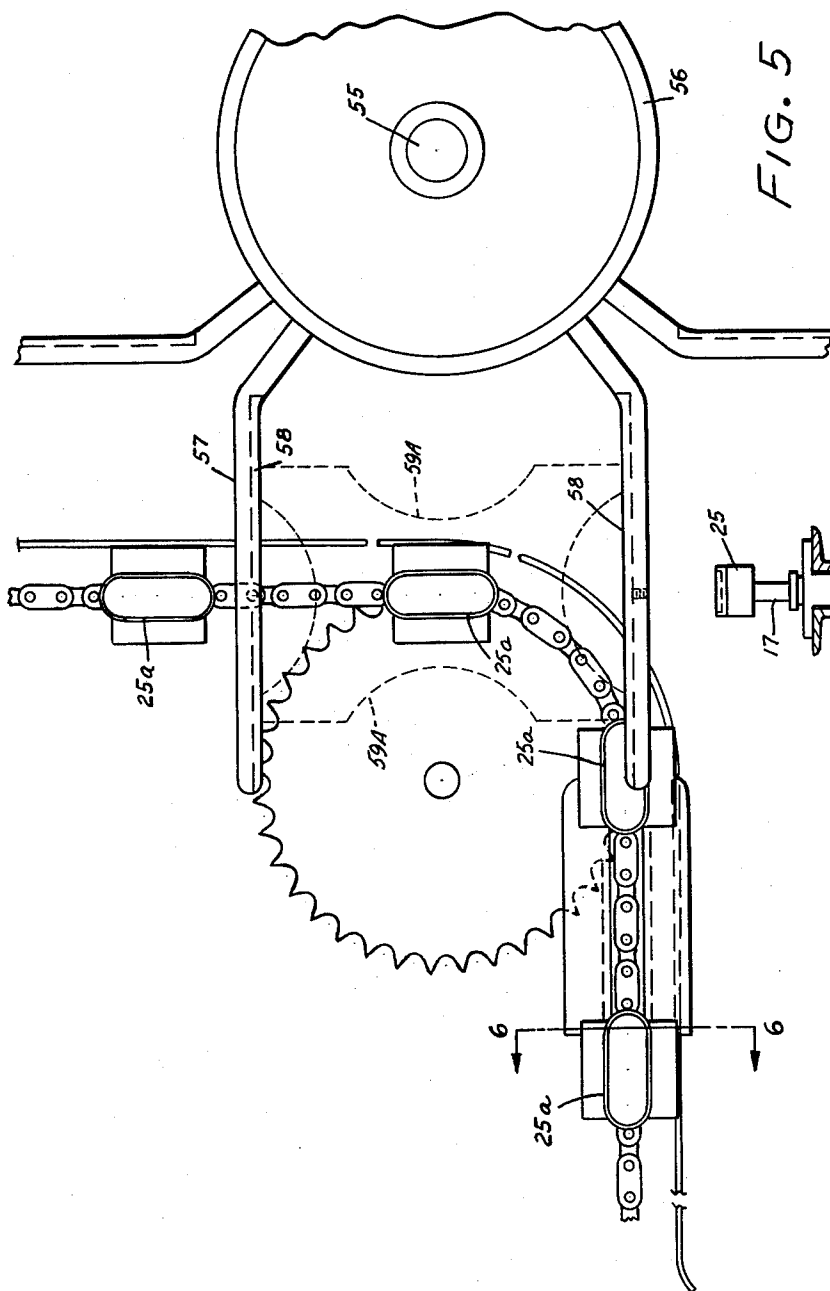


FIG. 5

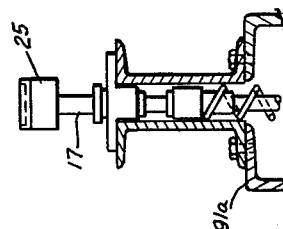


FIG. 6

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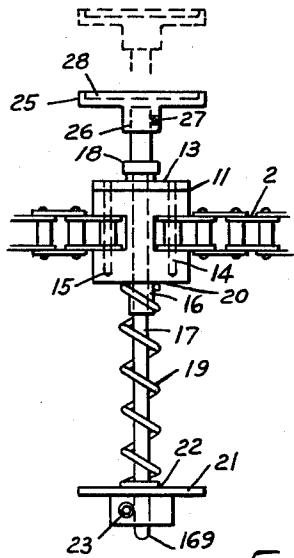


FIG. 8



FIG. 7a

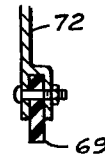


FIG. 7

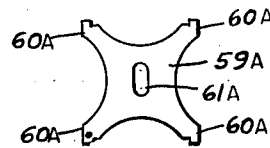


FIG. 10

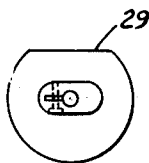


FIG. 9

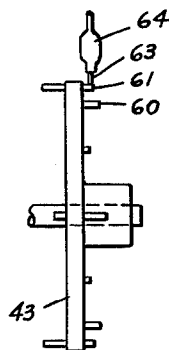


FIG. 11

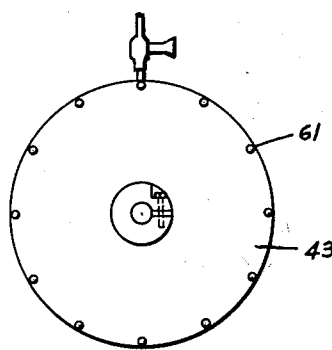


FIG. 12

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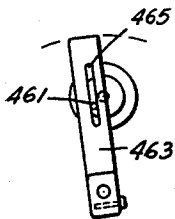


FIG. 13

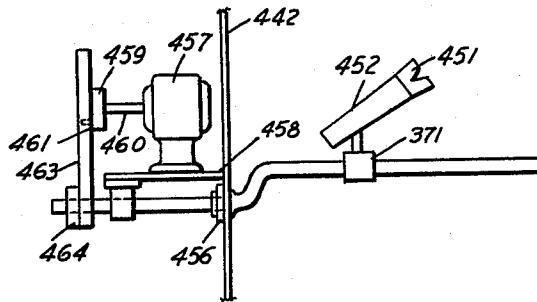


FIG. 14

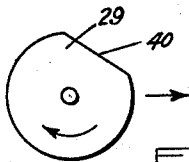


FIG. 15

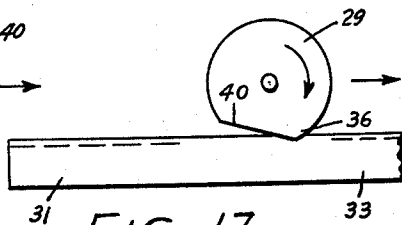


FIG. 17

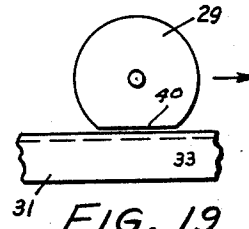


FIG. 19

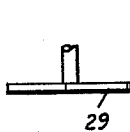


FIG. 16

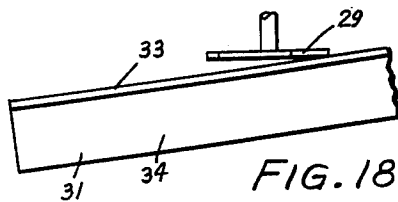


FIG. 18

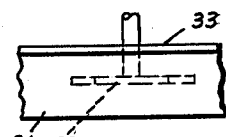


FIG. 20

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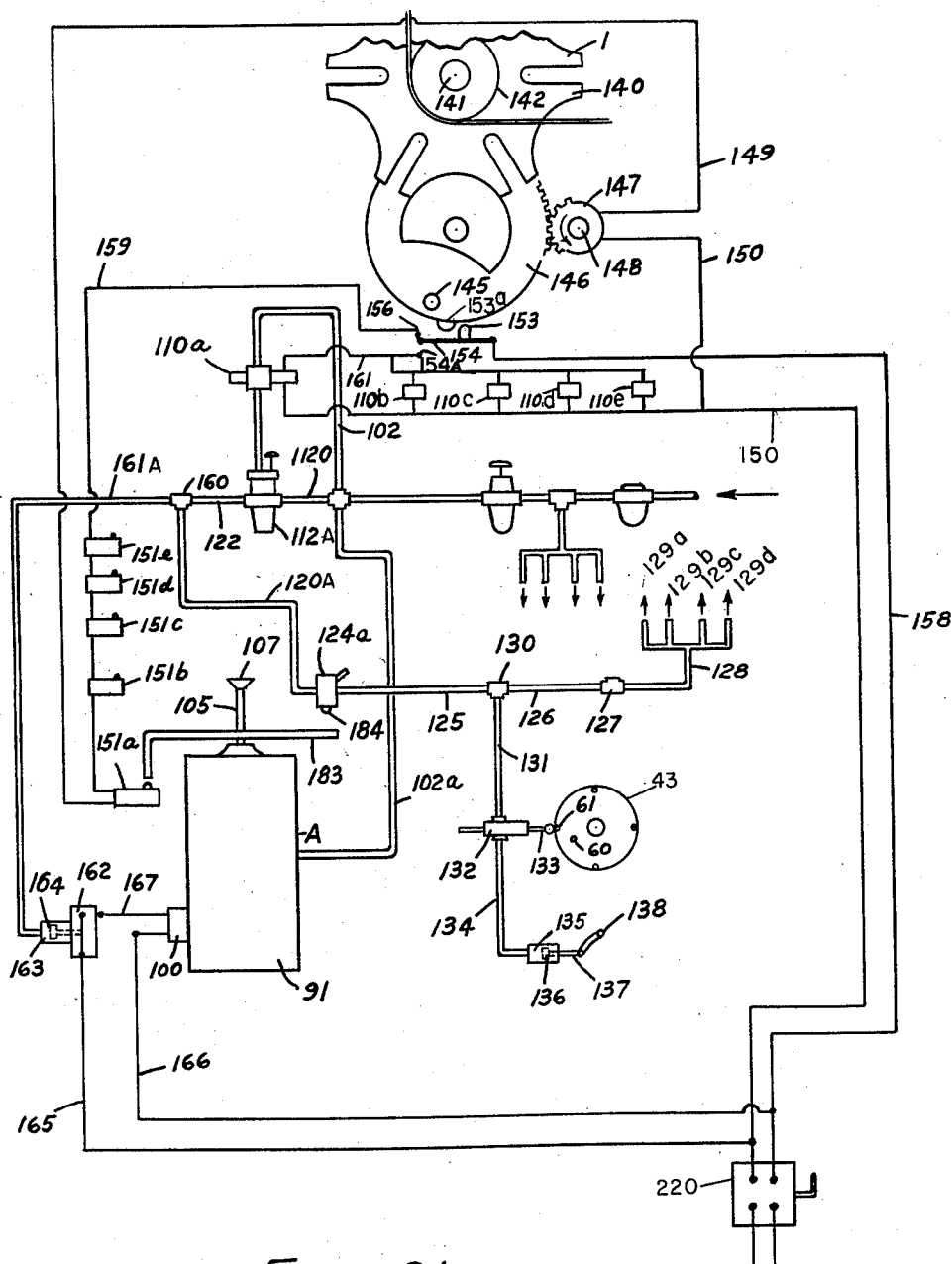


FIG. 21

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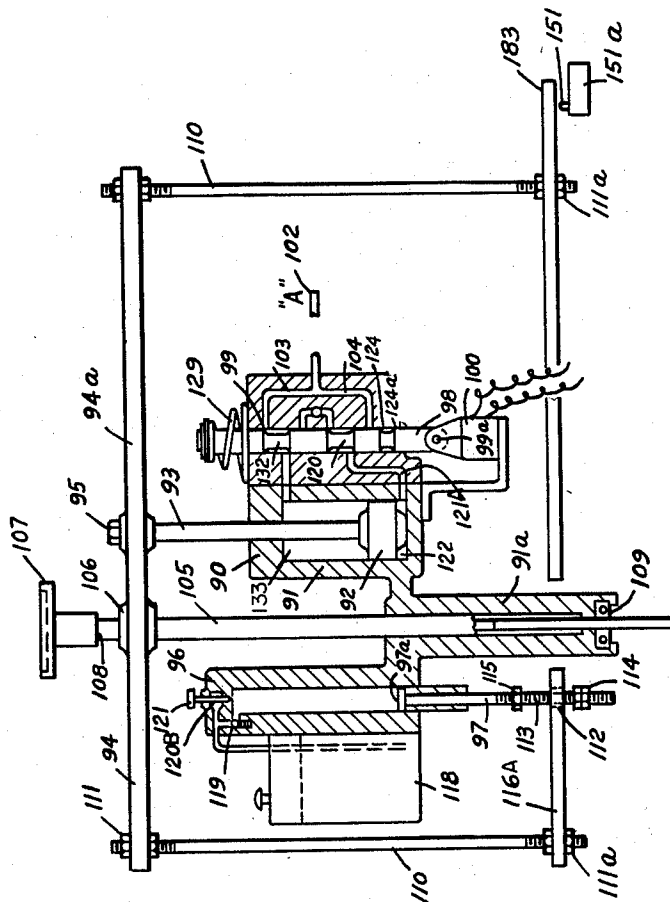


FIG. 22

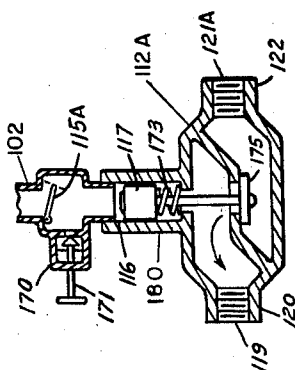


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MULTICOLOR PAINTING MACHINE

Robert B. Way and Carl D. Hersey, Erie, Pa.

Application July 18, 1955, Serial No. 522,806

11 Claims. (Cl. 118—11)

This invention relates to painting and finishing machines and more particularly to machines for depositing a coating of paint or finishing material of a multiplicity of colors on predetermined portions of articles of manufacture.

This application is a continuation-in-part of applications, Serial No. 392,152, filed November 16, 1953, which issued as Patent No. 2,820,231 on January 21, 1958, and Serial No. 408,185, filed February 4, 1954.

In painting and coating articles of manufacture, it is frequently necessary to apply several different colors of paint or coating. When more than two different coats of pigment are required, it is frequently desirable to apply the paint at several stations in a painting machine. Accordingly, disclosed herein is an automatic machine having several stations at which various painting operations may take place and through which a part to be painted moves continuously on a conveyor chain through the stations of the machine which perform various painting operations on the article. The article being finished also passes through a wiping or polishing station and, subsequently, to another painting station on the machine. The various wiping and polishing stations could be disposed between each successive painting station or the various operations could be varied at will to suit the particular finishing problem at hand. The painting stations incorporate a mask or stencil cleaning device which can be timed to clean the masks as often as necessary.

More specifically, it is an object of this invention to provide a machine for providing a plurality of successive painting and finishing operations on an article of manufacture as the part moves continuously through the machine.

Another object of this invention is to provide an improved automatic painting machine and mask cleaning machine.

A further object of this invention is to provide an improved means for carrying and supporting articles of manufacture as they pass through an automatic painting machine and to clamp masks on the articles as they are painted.

A still further object of the invention is to provide a painting machine incorporating a mask cleaning device and a timing mechanism for controlling the mask cleaning device to clean each mask on each use thereof or on alternate uses or after as many uses as desired.

Another object of this invention is to provide an automatic painting machine which is simple in construction, economical to manufacture, and simple and efficient to use.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawings and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the

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spirit or sacrificing any of the advantages of the invention.

In the drawings:

Fig. 1 is a schematic layout of an automatic painting machine according to the invention;

Fig. 2 is an enlarged top view of one of the units of the painting machine shown in Fig. 1;

Fig. 3 is a side view of the machine station shown in Fig. 2;

Fig. 4 is another view of the station shown in Fig. 2;

Fig. 5 is an enlarged top view of a part of the machine station shown in Fig. 2;

Fig. 6 is a cross sectional view taken on line 6—6 of Fig. 5;

Fig. 7 and 7a are enlarged views of the mask wiping device used on the machine shown in Figs. 1 to 6 inclusive;

Fig. 8 is an enlarged view of a part supporting device carried on a conveyor chain of the machine shown in Fig. 1;

Fig. 9 is a bottom view of the part holder shown in Fig. 8;

Fig. 10 is a top view of the mask used with the machine;

Fig. 11 is a view of the indexing device which controls the mask washing cycle;

Fig. 12 is a side view of the device shown in Fig. 11;

Fig. 13 is a bottom view of the paint gun moving mechanism;

Fig. 14 is a side view of the mechanism shown in Fig. 13;

Figs. 15 to 20 inclusive are views of the mechanism for aligning the part in the machine and bringing it into position to be painted;

Fig. 21 is a schematic piping diagram of the mechanism for operating the machine;

Fig. 22 is a view of the power unit for moving the part into position to be painted; and

Fig. 23 is a view of a timing valve.

Broadly, this invention comprises a plurality of spaced painting stations A, B, C, D, and E having a chain 2 which has equally spaced part carriers such as that disclosed in Fig. 5 attached to the chain 2 at equally spaced intervals. Each of the painting machines 3, 4, 5 and 6 and the wiping machine 7 at stations A, B, C, D, and E has a lock unit such as that disclosed in Fig. 22 mounted on the painting station. Each of the painting stations appears in side view similar to the painting station shown in Fig. 3 and has a mask carrying unit thereon such as that shown in Fig. 5. Fig. 21 shows Geneva gear 140 and driving gear 146. These will be duplicated at each of the painting stations. Also, the lock unit circuits will be actuated at each painting station by solenoid valves 110a and 110b connected to that station. Fig. 21 shows an air circuit which is used on each individual unit; however, Fig. 21 also shows the individual microswitches 151a through 151e inclusive. One of these microswitches is mounted on each station. It is necessary for each of the lock units to be at the top before current can flow through wires 159 and 149 to advance the conveyor and it is necessary for each and every one of the lock units on each and every one of the stations to have its article support in its lowermost position whereon the fixed frame rests on the actuating member of the normally open limit switches 151a to 151e before power can flow through the wires 149 and 159 to drive electric motor 148 ahead to advance the chain 2 to bring another part to each painting station. Each of the painting units has a solenoid valve 110a, 110b, 110c, 110d, or 110e thereon and all of these valves are connected in parallel across lines 161 and 150 as indicated.

When the drive unit 1 rotates to bring cam 153a into

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engagement with switch 154 to close the switch 154 intermittently, each and every one of the solenoid valves 110a and 110e will actuate its respective individual air circuit such as the circuit shown in Fig. 21 to initiate a painting operation at that station and at all stations simultaneously.

Now with more specific reference to the drawings, Fig. 1 shows the general arrangement of the operating units or stations of an automatic painting machine. A drive unit 1 intermittently indexes or drives the chain 2 in the direction of the arrows and the chain 2 has the part carrying devices attached thereto at spaced points which carry the articles of manufacture through the various stations where the painting operations are carried out. The machines shown in Fig. 1 are the painting and mask washing machines 3, 4, 5, and 6 which are generally similar units and which have devices mounted thereon to spray parts of one or more colors on predetermined parts of each article as it is indexed through the units to be stopped at the precise place in each station to bring it into the proper mask. The unit at station 7 is a wiping or polishing machine such as disclosed in patent applications, Serial Nos. 392,152 and 408,185. One of the units 7 could be arranged between each pair of the painting stations 3, 4, 5, and 6 to wipe excess paint from the article or to polish or buff the article after it leaves a station or unit or it could be used to wipe the paint from masks or from engraved letters, figures, or characters on the article being painted.

The chain 2 has the part carriers 28 attached thereto at spaced locations thereon. Bearing members 11 are connected to the chain 2 by pins 14 and 15 which are supported in holes in the bearing members 11 at their outer ends and are disposed in holes in links of the chain 2 at their intermediate portions so that, in effect, the bearing members 11 become links in the chain 2. Each bearing member 11 has a vertically disposed bore which freely and rotatably receives a shaft 17 and the shafts 17 each have a collar 18 fixed thereto which limits the downward movement thereof. The lower end of each shaft 17 has a disk 21 attached thereto and each disk 21 has a flattened side 29. As the chain 2 advances as indicated in Figs. 15 to 20, the disks 21 slide along and onto the members 34 and the flat sides thereof finally align themselves with the vertical leg 34 of the guide member 31. Therefore, the article supported in its holder is free to rotate while moving between stations but is restrained to a definite position and against rotation when at one of the machines 3, 4, 5, 6, and 7.

The piping diagram for the stations shown in Fig. 1 is shown in Fig. 21. The diagram shows the piping and air circuit for the entire system with only the complete air circuit for one station which is actuated by solenoid valve 110a. Identical circuits are actuated by solenoid valves 110b, 110c, 110d, and 110e. Each of the machines 3, 4, 5, and 6 has a lock unit such as that shown in Fig. 22 which forms a part of the machine. Each lock unit is made up of a shaft cylinder 91 mounted on a machine frame 91a and having a piston 92 movable therein. The piston 92 has a piston rod 93 attached thereto and to the piston rod 93 is attached a movable frame 94 by means of nut 95. Piston 92 is adapted to move frame 94 up and down relative to fixed frame 91a. A retarding cylinder 96 is attached to the fixed frame 91a and has a piston 97a having a rod 97 operable therein. A cylindrical shaped valve member 98 operating in a valve cylinder 99 is actuated by means of a solenoid 100 which has a movable armature attached thereto at 99a as shown in the air circuit in Fig. 21. Air under pressure is supplied from outer pipe 102 and air passages 103 and 104. A shaft 105 is attached to the movable frame 94 by means of a thrust bearing 106 and is free to rotate therein and a member 107 engages the lower end 169 of the shaft 17 which supports the article to be painted on the upper end of the shaft 17 to move the article up into

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masking position. The lower end of the shaft 105 is telescopically received in a bearing 109 and free to rotate therein.

Rods 110 are attached to the frame member 94 by means of nuts 111 and 111a securing frame members 116A to the rods 110 whereby frame members 94 and 116A are held together rigidly. Frame member 116A has a hole 112 therethrough which slidably receives end 113 of the rod 97. Nuts 114 and 115 are adjustable on the rod 97 in order to provide a certain amount of movement or lost motion between the frame 94 and the piston rod 97 before the piston 97a attached to the rod 97 is actuated and driven upward whereby fluid in cylinder 96 is compressed to retard the upward movement of frame 94 having cup 107 fixed thereto. That is, the frame member 116A can move with the movable frame 94 until it strikes the nut 115, at which time piston 97a will have to move with frame 116A and the movement of the frame 116A will be retarded by the piston 97a compressing fluid in cylinder 96 and pumping oil or other fluid into tank 118 through regulating valve 120B which can be adjusted by means of a handle 121 to regulate the flow rate of fluid and, therefore, the retarded action of the piston 97a. On the downward movement of the frames 94 and 116A when the article is moved away from the mask, the frames 94 and 116A will move downward until the member 116A engages the nut 114 and fluid will be drawn back into cylinder 96 through check valve 119. This will retard the downward movement of the frame 94 and will recharge the fluid cylinder 96 for the next cycle.

Masks 59A shown in Fig. 10 are supported in the mask carriers 56. There is a mask carrier 56 on each machine 3, 4, 5, and 6. The mask carriers 56 are each supported on a shaft 55 which extends vertically downward and is driven intermittently by motor 148 through a clutch actuated by clutch dog 138 as hereinafter described. The mask carrier 56 has radially extending arms 57. Each arm 57 has a portion extending parallel to another arm as shown in Fig. 5. A laterally disposed slot 58 is formed in each arm parallel and facing a corresponding slot in another arm 57. Masks 59A are each supported between two arms 57 by having their parallel edges 60A slid into slots 58 from the distal ends thereof inwardly so that each mask is supported between two arms 57. When the mask support is stopped in operative position, the article receiving portion 61A overlies the article to be painted supported on article support 25a. In this position, when the lock unit on the particular machine moves its frame 94 upwardly as will be later described, the lock unit member 107 will engage the lower end 169 of the shaft 17 and force the shaft 17 upwardly against the force of spring 19 to lift the article supported in the carrier 28 into engagement with the mask 59A. When the lock unit frame 94 has moved to its topmost position firmly nesting the article in the mask 59A, frame member 183 of the lock unit will engage valve 124a and turn on the paint guns to spray paint through the mask onto the article.

The wiping unit 6, the operation of which is described in applications, Serial Nos. 392,152 and 408,185, has a lock unit similar to that shown in Fig. 2, the operation of which is described in extreme detail in the said applications. The operation of this lock unit is identical to that of the unit described above and shown in Fig. 22. The overall power actuating circuit is shown in Fig. 21. The drive unit 1 has the Geneva gear 140 attached by shaft 141 to a sprocket 142. The sprocket 142 carries the chain 2 to drive sprockets 8 on units 3, 4, 5, and 6. Gear 140 on the drive unit 1 is driven by a pin 145 which is mounted on the gear 146 and gear 146 is driven by a sprocket 147 on the motor 148. The motor 148 is actuated through the switches 151a, 151b, 151c, 151d, and 151e mounted on the machines 3, 4, 5, and 6, respectively. Switches 151a through 151e, one of which is

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mounted on the lock unit on each machine, are each actuated when the respective lock unit on which the article is mounted is in its lowermost position; that is, when member 183 rests on the actuating switches 151a and the corresponding member on each other lock unit rests on its switch 151b to 151e. Since the switches 151a to 151e are connected in series, any one of them remaining open due to the corresponding lock unit having not returned to its rest position, will interrupt the circuit through motor 148 and it will not run.

During the painting portion of a cycle, the gear 146 will be in the position shown. Therefore, the lock units are all moved up to lift the respective rods and the switches 151a to 151e open as each paint unit completes its cycle and each of the switches 151a to 151e will be closed by the corresponding frame member 183 on each of the particular machines. This will actuate motor 148 and cause it to drive gear 146. The pin 145 engages the Geneva gear 140 to advance the chain 2 and bring another part to each machine 3, 4, 5, 6, and 7. As gear 146 continues to rotate, cam 153a will engage pawl 153 and close switch 154 to contact 154A. This will complete a circuit from wire 158 to wire 161 and excite the solenoids of valves 110a to 110e and allow air to flow from pipe 102 through check valve 115A (Fig. 25) to chamber 116 and force piston 117 of timer valve 112A on each machine down to open valve 175 and allow air to flow from pipe 1120 to pipe 122 to pipe 120A on each machine. Air will flow from pipe 122 to pipe 161A to valve 163 actuating piston 164 of valve 163 thereby closing switch 162, thus completing a circuit from wire 165 to wire 167 and connecting solenoid 100 across wires 165 and 166. This will cause solenoid 100 to pull valve cylinder 98 down and bring port 120 into alignment with pipes 104 and 121A, thereby allowing air to flow from pipe 104 to the pipe 122 below piston 92. This will drive piston 92 upward and carry frame 94 upward and bring the member 107 into engagement with the end 169 of the shaft 17 to raise the article supported at member 28 into the mask opening 61a. The opening of the valves 101a takes place while member 153a is on member 153, momentarily closing switch 154. As frame 94 of each lock unit on each machine moves upwardly, the member 183 moves off switches 151a to 151e, thereby interrupting the circuit through wire 149 to motor 148 since cam 153a has passed off pawl 153 and allowed switch 154 to return to its original position. Therefore, motor 148 will be de-energized and will not drive while any one of the frames 94 of the lock units are in the "up" position. A paint gun 452 is mounted on the crank 371 and the paint gun 452 has a nozzle 451. The crank 371 is journaled on a fixed frame 442 of the machine at 456. A motor 457 is supported on a member 458 fixed to the frame 442 and the motor 457 drives a crank 463 through a coupling 459. The coupling 459 rotates with a shaft 460 and has a pin 461 which slides in a slot 465. A crank 463 is fixed to the crank 371 at 464. The motor 457 is driven at a constant speed, either by air from the air supply 120 or it could be driven by electricity. As the shaft 460 rotates, the crank 463 is oscillated. Therefore, since the paint gun 452 is fixed to the crank 371, it will oscillate in an arcuate path somewhat in the manner in which a paint gun held in the hand of a skilled painter moves to distribute the paint evenly over the article being painted. This prevents the paint film sprayed by the gun from becoming of irregular thickness as would be the case if the gun were held stationary.

The sequence of operation of the drive unit and the power units is: Starting with all article supports down, the operator loads an article on the article carrier 25a preceding the first paint station. He then depresses the foot pedal 220 and turns on air to pipe 102. The gear 146 will be in the position shown and all of the switches 151a to 151e are closed. Therefore, a circuit will be

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completed through the switch 154 and through all the switches 151a to 151e to motor 148. As soon as the power is turned on, the motor 148 will start to rotate the gear 146 to advance the chain 2 to bring the part just loaded into the first painting station. The motor 148 will continue to drive the gear 146 until the cam 153a strikes the pawl 153. This will swing the switch 154 down to the point 154A and thereby excite the solenoid valves 110a to 110e. This will start the timer valves 112A on each machine which will supply air to the switch 162 which will actuate the solenoid 100 and start the lock unit frames 94 upward. This will allow all the switches 151a to 151e to open so that when the cam 153a passes the pawl 153, the wires 159 and 149 will be opened and motor 148 will stop and will remain stopped until the frame 183 on each of the lock units has returned to its downward position. Then all of the switches 151a to 151e are again closed.

When the lock units have reached the top of their stroke, they will strike the actuating member 184 on valve 124a and will allow air to flow through pipe 125 to actuate the guns through pipe 128 to spray paint on the part. Air will flow through pipe 131 through pipe 134 when disk 43 is in the proper position to open actuating member 133. Thus, paint and solvent will continue to spray at each machine until the timer valve 112A is timed off and air is closed off from pipe 1120. This will stop air from flowing through the pipe 161A and the switch 162 will open, allowing the valve cylinder 98 to move back upward and drive air into space 133 above the piston 92 and drive the frame 94 downward until all of the frames 183 have reached their lower positions and close all of the switches 151a to 151e. This will again excite the motor 148 and start it to rotating and advancing the chain 2 another position, driving another part under each of the painting stations on the machines 3, 4, 5, and 6 to be painted.

During the time that timer valve 112A is actuated, air will also flow from T-branch 130 to the lead pipe 131 when each lock unit is at the top of its stroke, opening three-way valve 124 to normally closed valve 132. When indexing unit 43 has moved to the proper position and one of the pintles 60 and 61 has been moved into engagement with the follower or actuating member 233, the three-way valve 132 will open, allowing air to flow through the pipe 134 into a cylinder 135 to force a piston 136 therein to move piston rod 137 to actuate a dog clutch 138 which will rotate shaft 55 to rotate the mask carrier 56 through the shaft 55 and bring the masks into position between spray head 65 and solvent will be forced onto them. The masks will be rotated further by the mask carrier 56 between squeegee members 69 and 70 which will wipe the excess solvent off of them and the air from the vents will dry the masks. As explained previously, this movement of the mask and washing the mask does not occur in every painting cycle; that is, several parts may be painted at each station before a mask is washed after a predetermined number of cycles determined by the position of the pintles 60 and 61.

It will be noted that the wiping machine 6 has a solenoid actuated valve similar to the valve member 98 shown in Fig. 22 which actuates the wiping machine and wipes the part which has been carried into position by the chain 2. The action of the wiping machine is disclosed in the preceding applications. The valve 124 is actuated only to keep the guns from being turned on until the unit gets to the top.

The foregoing specification sets forth the invention in its preferred practical forms but the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an ex-

clusive property or privilege is claimed are defined as follows:

1. A painting machine for applying paint to an article of manufacture at a plurality of successive stations comprising a plurality of spaced stations, paint applying means on each said station, a conveyor, said conveyor comprising a chain having a plurality of spaced rotatable upwardly extending rods thereon, masks supported on each said station, means to advance said chain intermittently to move one said rod into position under each said mask, an article support on the upper end of each said rod, means on each said station to engage the lower end of each said rod to move said rod upwardly and to bring said article into operative relation to said mask, and means to energize said paint applying means when said article is in operative relation to said mask to spray paint through said mask onto said article.

2. The machine recited in claim 1 wherein said means to move said rods upwardly moves said rods downwardly after the said painting and said conveyor moves said article to another of said machines, means on said second mentioned machine moves said article into operative engagement with a mask on said machine, and paint actuating means is actuated when said article is in said masking means.

3. A finishing machine comprising a plurality of finishing stations each adapted to perform a finishing operation on an article of manufacture, a sprocket on each said station rotatable about a vertical axis thereon, a continuous conveyor chain supported on said sprockets, means to drive said chain around said sprockets, a plurality of spaced article supports on said chain, means on each said article support to support an article of manufacture, a mask supported at each said finishing station, means at each said station to lift each said article support relative to said chain to bring an article therein into engagement with the said mask at that station, coating applying means at each said station for applying coating to said articles when in said masks, means on each said finishing station to actuate said coating applying means when a said article is in the said mask at the said station, and means to stop said chain drive means when a said article support is in operative position relative to a said mask.

4. The machine recited in claim 3 wherein each said article support comprises a shaft having a cam attached to it, each said station having guide means thereon rotating said shaft and said article support thereon a predetermined position relative to said masks supported at each said station.

5. The machine recited in claim 4 wherein each said cam comprises a disk attached to the lower end of each said shaft and having one flattened side, said guide means comprise members having a flat generally vertically extending side and a flat generally horizontally extending side, and follower members on said machine, said generally horizontally extending sides being inclined slightly upwardly in the direction of travel of said chain, said follower members being disposed laterally from said shafts a distance equal to the distance from each said shaft to said flattened side of each said disk, each said disk engaging the said horizontal sides of said follower members, each said disk being moved along the top of each said horizontal side and being rotated thereby to bring said flattened side of said disk into registration with said vertical side.

6. A finishing machine comprising a finishing station, a mask carrier at said station, said mask carrier being rotatable about a vertical axis, spaced, generally radially extending arms on said mask carrier, each said arm having an axially extending slot therein facing a slot in an adjacent arm, a plate like mask carrier slidable into each said slot, a mask supported on each said plate like mask carrier, an article support on said station, means to move each said mask into operative relation with an article

supported on said article support, means to move an article supported by said support into operative engagement with said mask, coating applying means to apply coating material to an article supported in each said mask, vertically spaced spray heads on said machine for spraying coating solvent on said masks, means to intermittently drive said mask carrier to bring said masks into position between said spray heads, and actuating means to actuate said spray heads to selectively spray coating solvent on a said mask when it is moved into position between said heads.

7. The machine recited in claim 6 wherein said means to intermittently move said mask carrier comprises a disk member supported on said stations, cam means on said disk, and means actuated by said cam means to drive said mask support to bring another mask into operative position when said means is actuated by said cam, said cam means being adapted to be rearranged on said disk whereby the number of articles painted with a given mask before said mask is washed is controlled.

8. The machine recited in claim 6 wherein vertically spaced, resilient blade like squeegee members are supported on said machine adjacent said spray heads, said squeegee members engaging said masks after solvent has been sprayed thereon to remove excess solvent therefrom.

9. A finishing machine comprising a plurality of finishing stations each adapted to perform a finishing operation on an article of manufacture, a sprocket on each said station rotatable about a vertical axis thereon, a continuous conveyor chain supported on said sprockets, means to drive said chain around said sprockets, a plurality of spaced article supports on said chain, each said article support comprising a bearing member having a vertically extending bore therein, a shaft slidably supported in each said bore, a spring urging said shaft downwardly, a mask supported at each said finishing station, lifting means on each said station to engage the lower end of each said shaft to lift said shaft to bring an article supported in said article support into engagement with the said mask at said station, coating applying means at each said station for applying coating to said articles when in said masks, means on each said finishing station to actuate said coating applying means when a said article is in the said mask at the said station, and means to stop said chain drive means when a said article support is in operative position relative to a said mask.

10. A finishing machine comprising a plurality of finishing stations each adapted to perform a finishing operation on an article of manufacture, a sprocket on each said station rotatable about a vertical axis thereon, a continuous conveyor chain supported on said sprockets, means to drive said chain around said sprockets, a plurality of spaced article supports on said chain, means on each said article support to support an article of manufacture, a mask supported at each said finishing station, means at each said station to lift each said article support relative to said chain to bring an article therein into engagement with the said mask at that station, coating applying means at each said station for applying coating to said articles when in said masks, means on each said finishing station to actuate said coating applying means when a said article is in the said mask at the said station, and means to stop said chain drive means when a said article support is in operative position relative to a said mask, said coating applying means being actuated by an actuating member actuated by said means to lift each said article when said articles are lifted into engagement with said masks.

11. A finishing machine comprising a plurality of finishing stations each adapted to perform a finishing operation on an article of manufacture, a sprocket on each said station rotatable about a vertical axis thereon, a continuous conveyor chain supported on said sprockets, means to drive said chain around said sprockets, a plurality of spaced article supports on said chain, means on each

said article support to support an article of manufacture, a mask supported at each said finishing station, means at each said station to lift each said article support relative to said chain to bring an article therein into engagement with the said mask at that station, coating applying means at each said station for applying coating to said articles when in said masks, means on each said finishing station to actuate said coating applying means when a said article is in the said mask at the said station, and means to stop said chain drive means when a said article support is in operative position relative to a said mask, said means to drive said chain being started by a plurality of members each on one said station, said members being moved into actuating position when said article supports on each

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said station have all returned to a lowered position on said chain.

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