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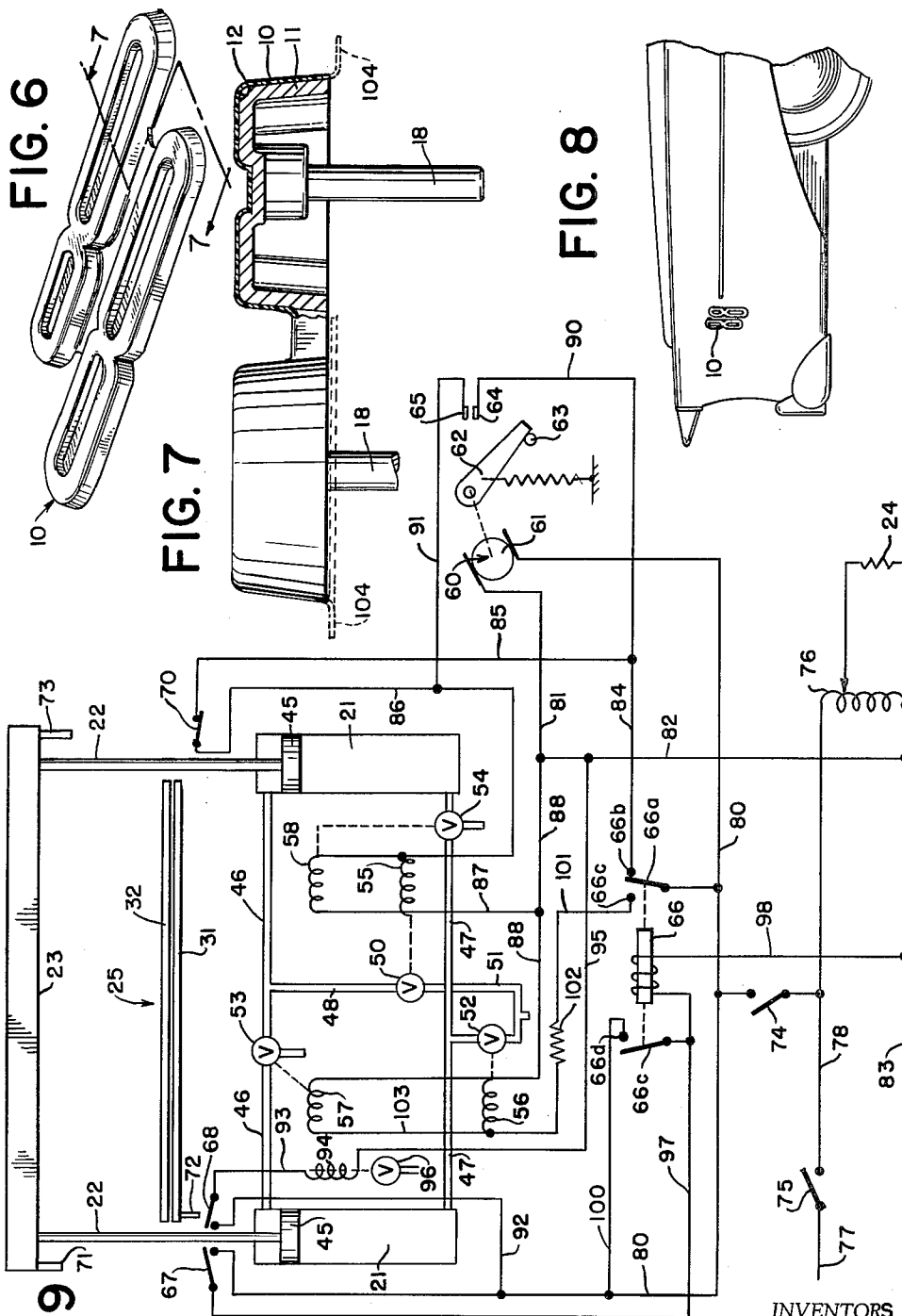


FIG. 6

FIG. 7

FIG. 8

FIG. 9

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APPARATUS FOR MAKING A PLASTIC PAINTING SHIELD

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5 Claims. (Cl. 18—19)

The present invention relates to a plastic painting shield and particularly to such a shield for use in the painting or repainting of automobile bodies, the shields being used to protect the ornaments commonly in use on such automobile bodies.

At the present time in body shops where automobile bodies are repainted the problem of protecting the ornaments and insignia is solved in one of three manners.

One mode of protecting the ornaments and insignia such as the manufacturer's name is to remove such insignia from the car before the painting is performed and to replace them when the paint job is completed and the paint is dry. This method, however, is extremely expensive because many of the ornaments are affixed to the car in inaccessible places so that in removing the ornaments they become broken and thus have to be replaced.

Additionally the replacement is extremely difficult because in many instances the ornaments are affixed to the car by means of studs integral with the ornaments which extend through apertures in the car body and are affixed on the interior by means of clips or the like. If the ornaments are affixed, for example, on a closed in fender or on a door the problem of replacing the ornaments after the painting has been completed is great and the solution involves the expensive method of removing parts of the car body and replacing them thereafter.

Due to the expense the method just above described is seldom used but instead it is customary to utilize pressure sensitive tape and to cover the ornaments with this tape. In placing tape of this character on all of the ornaments of a modern automobile a time period in the neighborhood of 2½ to 3 hours is frequently required. Thus this method also becomes expensive. Additionally it is very difficult to have the tape cover the ornaments completely including the side wall portions thereof without having some tape edges project over and cover adjacent areas of the body which should be painted but which, as a result of this improper taping, are not.

A third method of protecting the ornaments during painting is to grease the ornaments so that the paint will not adhere thereto. This operation also is time consuming and additionally when the protection is sought to be given by this method the likelihood of the grease extending onto the car body is great with the result that areas which should be painted are not painted. Also, if any attempt is made to wash the grease off before the paint is fully dry or, in fact, if the automobile is out in the weather for a considerable period after the paint is apparently dry, the grease flowing over the new paint will frequently irreparably damage that paint so that the quality of the paint job is greatly impaired.

By our present invention we provide a painting shield particularly for use in connection with the repainting of automobiles which conforms exactly to the shape of the ornament to be protected and which extends fully along the side wall portions thereof and lies against the body so that there is no area of the body which should not be covered which is covered while at the same time the entire surface of the ornament or insignia is covered and protected. Further the painting shield of this invention conforms so exactly to the shape of the pro-

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ected ornament that it is unnecessary to use any adhesive to retain the shield on the ornament during the painting operation. Instead, it is only necessary to place the shield over the ornament and proceed with the painting.

In this connection it might be mentioned that painting shields are supplied in sets for a particular make and model of car so that all of the insignia and ornamentation is readily protected by merely slipping the various painting shields over the various ornaments prior to the painting operation. This installation of the shields on the car takes a matter of a very few moments so that the time saving effected by the use of our painting shields is considerable and the expense of the painting correspondingly reduced.

The plastic shields of the present invention may readily be formed from thin sheets of thermoplastic material such, for example, as polystyrene. There is disclosed herein mechanism for forming a plurality of painting shields in accordance with our invention from a single sheet of plastic material which mechanism is simple and inexpensive and is capable of forming such painting shields rapidly and inexpensively while assuring that the shields conform exactly to the shape of the ornaments since the shields are formed by utilizing like ornaments as molding forms.

It is an object of the invention to provide a painting shield or mask to protect three-dimensional insignia or ornaments which painting shields conform exactly to the ornaments and are thus retained upon the ornaments during painting without the necessity of providing any fastening means.

It is another object of the invention to provide a method of painting automobile bodies utilizing plastic shields to protect the ornaments while at the same time assuring that areas of the automobile body adjacent the ornaments are not covered and therefore not painted.

It is another object of the invention to provide a means for forming such plastic painting shields which is simple and which produces painting shields which conform exactly with the outlines of the ornament or insignia to be protected during the painting operation.

Other objects and features of the invention will be apparent when the following description is considered in connection with the annexed drawings, in which,

FIGURE 1 is a fragmentary side elevational view, partly in section, of a machine for forming painting shields from sheets of thermoplastic material;

FIGURE 2 is a fragmentary cross-sectional view taken on the plane of the line 2—2 of FIGURE 1 and showing particularly the mode in which the plastic sheet is clamped in a frame and is brought into position to be molded over body ornaments which serve as molding forms;

FIGURE 3 is a fragmentary cross-sectional view of the machine of FIGURE 1 showing particularly the mode of latching the frame, carrying plastic sheet in its lower position and showing also certain apertures in the base plate through which a vacuum is drawn to cause the plastic sheet to conform with the molding forms;

FIGURE 4 is a front plan view of a base plate which supports the molding forms or ornaments indicating the manner in which the ornaments are placed on the plate;

FIGURE 5 is a vertical cross-sectional view taken on the plane of the line 5—5 of FIGURE 4 showing particularly the mode of placing the ornament on the form and holding it in position spaced slightly from the form in order to assure that the side walls of the painting shield will be coextensive with the side walls of the ornament;

FIGURE 6 is a perspective view of a typical form of painting shield in accordance with our invention;

FIGURE 7 is an end elevational view of the shield of

FIGURE 6 partly in section showing the shield in position on an ornament. This view also illustrates in dotted lines the portion of the plastic sheet which is removed after the molding operation in order to sever the various shields produced during a single molding operation and to assure that the side wall portions of the painting shield be coextensive with the ornament on which it is to be placed;

FIGURE 8 is a fragmentary view showing an automobile fender with one of the ornaments thereon showing the mode in which the plastic shield of this invention exactly covers the ornament in the form of the numeral 88 and permits painting of the automobile body without covering any area which should not be covered while at the same time fully protecting the numerals mentioned; and

FIGURE 9 is a schematic electrical and piping diagram of the machine illustrated in FIGURES 1 through 5.

Referring now particularly to FIGURES 6, 7 and 8, there is illustrated therein a painting shield consisting of the numeral 88. In FIGURE 6 the painting shield designated 10 is shown in a perspective view while in FIGURE 7 the shield 10 is shown in position on an ornament 11 which ornament may be affixed to an automobile body or may be an identical ornament used as a molding member in the production of the shield shown in FIGURE 6.

In FIGURE 8 the same shield 10 is shown in position on an ornament which is in turn positioned on the fender of an automobile. Thus this ornament is protected by the shield and the fender of FIGURE 8 is prepared for the painting operation merely by slipping the shield 10 over the ornament 11.

As will be apparent from the following description the shield 10 conforms closely to the form of the ornament 11 and thus it is not necessary to adhere the shield to the ornament but rather it will remain in position by merely being slipped over the ornament. It will be understood, however, that if desirable the inner surface such as indicated at 12 in FIGURE 7 may be provided with areas of pressure sensitive adhesive so that the shield will be retained by the ornament during the painting operation.

Referring now to FIGURES 1 through 5 the painting shield of this invention may readily be manufactured by the use of the apparatus shown therein. A table 13 is provided, this table being supported upon side members 14 which, together with front and back members not shown, constitute a cabinet in which various portions of the operating mechanism are used. Mounted upon the table 13 is a generally rectangular rim 15 provided with recesses near upper edges 16 which serve to support a perforated board 17. The board is perforated in order to hold the stems 18 of ornaments such as indicated at 11, the stems being provided with shim members 20 before the stems are inserted through the perforations in order to space the lower edges of the ornaments slightly above the board 17. Additionally perforations are provided in the board to assure that the area beneath the ornaments be evacuated during the forming of the plastic shields thus making certain that the shields conform exactly with the outline and shape of the respective ornaments.

Mounted within the cabinet formed by the sides, front and back mentioned are two air cylinders 21 the piston rods 22 of which extend upwardly through the table 13 and have fixed thereto at their upper edges a hood 23 in which an electrical heating element 24 is positioned.

The frame member generally designated 25 is positioned above the form board 17 being guided for vertical reciprocatory movement by means of the four bolts 26 which extend through bushings 27 in the table and are retained by means of the nuts 28. Coil springs 30 extend between the table top and the undersurface of the frame member 25 thus urging the frame to its uppermost position. Frame 25 comprises a lower rectangular frame member 31 and an upper rectangular frame member 32,

the two members being hinged together by means of the hinge 33, see FIGURE 2, and being provided with a sealing gasket 34. The additional two latch members 35 hold the two frame members in their closed position in which they firmly grasp a sheet of thin plastic material 36 which is placed between the members 31 and 32. Mounted on the table 13 beneath the lower frame member 31 is a gasket 37 which serves to seal the space within the frame and beneath the plastic sheet 36 when the frame 25 is in its lowermost position.

As indicated particularly in FIGURE 3 a latch member 38 is provided, this member being pivotally mounted on a bracket member 40 fixed to the table 13 and being urged in a counterclockwise direction by means of a coil spring 41. Thus as the frame 25 reaches its lowermost position compressing the gasket 37 the latch engages the upper edge of the lower frame 31 and holds it in its lowermost position against the urge of the springs 30 until manually released.

Referring again to FIGURE 1, it will be seen that an enclosure is formed beneath the board 17 and the articles or ornaments 11 thereon, this enclosure being normally formed of sheet metal and comprising a rectangular disk-like member 42 having outwardly extending flanges 43 which are fixed to the underside of the table 13, the joint being made airtight.

A pipe 44 is connected to the base of the member 42, this pipe being connected to a vacuum pump so that the space beneath the plastic sheet may be evacuated.

Referring now to FIGURE 9 which shows the elements already described in a rather schematic form and in addition the various electrical control devices, the operation of the mechanism will be described. As seen in FIGURE 9, each of the air cylinders 21 is provided with a piston 45 which is connected by means of the piston rods 22 to the hood structure 23. The air cylinders 21 have pipes connected thereto at each end so that air may be admitted to either side of the piston. The pipes at the upper end of the cylinders 21 are designated 46 while those at the lower ends are designated 47. Pipes 46 are connected together by means of a T or like fitting and are connected to a pipe 48 which connects with valve 50 and thence through pipe 51 to a source of pressure not shown. In a similar manner the two pipes 47 connect through a valve 52 to the pressure source.

In addition, a valve 53 is connected in one of the two pipes 46 and is arranged when open to connect these pipes to atmosphere. In a like manner the valve 54 is connected to one of the pipes 47 and when open connects these pipes and the lower ends of the cylinders 21 to atmosphere. Valves 50, 52, 53 and 54 are solenoid operated being operated respectively by the solenoids 55, 56, 57 and 58 as indicated by the dotted lines in FIGURE 9.

The electrical control circuit includes a motor driven timing device generally designated 60. This timing device includes the alternating current motor 61 which drives an arm 62 which is spring urged in a clockwise direction against a stop 63 but which when driven by the motor moves into contact with one of the contacts 64, 65 thereby closing the contact 64 against contact 65. So long as the motor 61 remains energized the contacts 64, 65 will remain closed once they have been closed by movement of the arm 62. Since there is a gear connection between the motor and arm 62 an appreciable interval of time will be present after the motor is energized before the contacts close.

The electrical circuit also includes a relay 66 and microswitches 67, 68 and 70, these microswitches being operated by switch operators, two of which are located on the hood 23 and the third on the frame 25 the switch operators being designated 71, 72 and 73. The only additional element of the electrical circuit which needs to be described prior to tracing the operation of the device through a cycle is the switch 74 which is of a

latching type and once operated does not release until manually released and again closed.

In order to operate the device to form a plurality of plastic painting shields in accordance with our invention, the desired ornaments are placed upon the board 17 by inserting the stems 18 thereof through the board as shown in FIGURES 4 and 5. Thereafter the frame 25 is opened, that is, the two elements 31 and 32 separate and a sheet of plastic such for example as polystyrene is placed on the lower frame 31 and the upper frame closed against it, the sealing gasket thus holding the plastic tightly in the frame.

The switch 75 is now closed and the auto transformer 76 is thus energized thereby energizing the heating coil 24. The heating coil thus immediately heats and since it lies above the plastic in the frame 25 and is enclosed in the hood 23 begins to warm the plastic slightly.

Switch 74 is now closed and current thus supplied from one side of the A.C. line designated 77 over switch 75, conductor 78, switch 74, conductor 80 to motor 61 and thence over conductors 81 and 82 to the other side of the A.C. line designated 83.

Simultaneously with the completion of the circuit through the motor 61 a circuit is completed leading through the switches mentioned and thence through the armature 66a and contact 66b of relay 66 to conductor 84 and thence over conductor 85 and through normally closed microswitch 70 to conductor 86 and through solenoid windings 55 and 58 to conductors 87 and 88 to the return conductor 82.

As a result of the completion of this circuit valves 50 and 53 are operated admitting air under pressure to the upper ends of cylinders 21 and connecting the lower ends of these cylinders to atmosphere. The hood 23 now moves downwardly until the members 29 extending across the hood 23 as indicated in FIGURE 1 strike the frame 25 at which time the frame likewise starts to descend.

After a very slight amount of movement of frame 25 the switch operating member 73 operates the normally closed microswitch 70 and opens it. As a result the circuit to the solenoid 55 and 58 is opened and valves 50 and 54 return to their normal closed position thus retaining the hood 23 and the frame 25 in the positions they have then attained. While the hood is in its position it is of course true that the heater element 24 is immediately above the frame 25 and spaced a short distance above the plastic sheet so that the plastic sheet is now heated to a fairly elevated temperature although not sufficiently to cause the plastic to flow.

Shortly after this the arm 62 of the timer unit 60 reaches a position where it causes contact 64 to engage contact 65. Due to this a circuit is completed from conductor 84 over conductor 90 and contacts 64 and 65 and conductor 91 to conductor 86 and thence through a circuit previously traced to the solenoids 55 and 58. These solenoids again energize and their corresponding valves 50 and 54 open thereby causing the hood to descend and the frame 25 to move to its lowermost position.

When the hood and frame reach their lowermost positions switch operators 71 and 72 cause microswitches 67 and 68 respectively to close. As a result of closure of microswitch 68 a circuit is completed from conductor 80 through conductor 92, microswitch 68 and conductor 93 to the solenoid 94 and thence over conductor 95 to return conductor 82. Solenoid 94 then operates and causes operation of valve 96 which then connects the pipe 44 to a source of vacuum and thus draws the plastic sheet down around the forms on the board 17 in the manner shown particularly in FIGURE 3.

Closure of microswitch 67 completes a circuit from conductor 80 through that microswitch and thence through conductor 97 to the winding of relay 66 and over conductor 98 to the opposite side 83 of the A.C. line. Relay 66

then energizes and its armature 66c closes against contact 66d thus completing a circuit from conductor 80 over conductor 100 and through the contact 66d and armature 66c to the relay winding thus causing the relay to be held in its energized position.

At the same time energization of relay 66 causes armature 66a to open the circuit through contacts 64 and 65 and deenergize the solenoids 55 and 58 thereby holding the hood 23 in its lower position. Also armature 66a engages contact 66e and completes a circuit from conductor 80 over conductor 101 and through a thermistor 102 and conductor 103 to solenoids 56 and 57 and thence over conductor 88 to the return conductor 82. As a result of the completion of the last traced circuit solenoids 56 and 57 operate after a lag results from the use of the thermistor 102 in the circuit.

Upon operation of the two solenoids mentioned valves 52 and 53 are opened thus connecting the upper ends of the cylinders 21 to atmosphere and the lower ends to a source of pressure. Hood 23 now moves upwardly to its upper limit. Frame 25, however, does not move since it has been latched in its lower most position by means of the latch 38. The enclosure formed by the member 42 and the plastic sheet remains in its evacuated condition and the plastic now cools and sets in the form shown in FIGURE 3, that is, drawn down about the sides of the ornaments and adhering closely to all of the surfaces of the ornaments. Thus a sheet is formed having exactly molded configurations of all of the ornaments on the board, these ornaments being interconnected by horizontal portions of the plastic sheet which lie against the upper surface of the board 17.

The operator may now release the latch 38 permitting the frame 25 to rise to its upper position and thereafter release the latch 35 opening the frame 25 and may then remove the formed plastic sheet. The operator will then place a new sheet in the frame and close the frame after which he will open and again close switch 74.

As previously indicated, the opening of switch 74 deenergizes the motor 61 and thus permits the arm 62 to return against its stop 63 under urge of the spring. Also the opening of switch 74 deenergizes the relay 66 which falls back to the position shown in FIGURE 9. Upon a reclosure of switch 74 the cycle hereinabove described is repeated.

It is only necessary in order to complete the formation of the desired painting shields that the portions of the sheet joining the various ornament outlines be removed. This may be done in many ways but we have found it desirable to pass the ornaments across a horizontal surface above and slightly spaced from which there is a heated wire, the spacing being such that the plastic sheet is cut at the base of the ornament for removing the horizontal and a very small portion of the substantially vertical portions of the sheets such as indicated in dotted lines in FIGURE 6 and designated 104.

Although this is not necessary it is generally preferable to form all of the ornaments for a particular make and model of a car at one time so that when the painting shields are separated from the joining portions of the sheet there will be present a complete set of shields for that particular automobile.

What is claimed is:

1. In a device for forming three-dimensional plastic shields for automobile ornaments from a sheet of plastic material, in combination, a table, means mounting a plurality of ornaments used as molds on said table, a frame for holding a sheet of plastic material, means mounting said frame for vertical reciprocatory movement toward and away from said table and the ornaments thereon, means normally urging said frame to an upper position, a hood mounted for vertical reciprocatory movement above said frame, an electrical heating element mounted in said hood, a pair of air cylinders, each having a piston and piston rod, means connecting the piston rods of said air cylinders to opposite ends of said hood, means to

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apply pressure against said air cylinder pistons to lower said hood to thereby cause a plastic sheet mounted in said frame to be heated, means on said hood engaging said frame to force said frame into its lower position with the plastic sheet therein in contact with said table and the ornaments thereon, means comprising a sealing gasket of generally rectangular form fixed to said table and co-operating with the plastic frame to form an air tight enclosure, means to apply a vacuum through said table to the space beneath said sheet, and means to apply pressure to the opposite side of said air cylinder pistons after a predetermined time interval to cause said hood and heater to restore to initial position.

2. A device according to claim 1 wherein admission of air to said air cylinders is controlled by solenoid operated valves and wherein said solenoid operated valves are controlled by an electrical circuit including timing means.

3. A device in accordance with claim 2 wherein said timing means comprises a motor driven timer energized upon operation of a manually operated pushbutton, a circuit also completed by operation of said pushbutton to operate said solenoid valves and pressurize the upper ends of said air cylinders to thereby cause said hood to move downwardly, a microswitch mounted in the path of said frame whereby after said hood has moved downwardly a predetermined distance carrying said frame with it, said solenoid valves are closed to retain said hood and frame in the attained position, said timer means operating after a predetermined time to close circuits through said solenoid valves and cause said hood and frame to complete their downward movement, a microswitch operated as said frame moves into final position, said microswitch closing a circuit through a solenoid valve admitting suction to the space beneath said plastic sheet, a second microswitch actuated as said hood moves into its lowest position, said microswitch closing a circuit to energize solenoid valves for applying pressure to the lower ends of said pistons whereby said hood is restored to its normal position, said energizing circuit for said last mentioned solenoid valves including a delay means whereby said hood and heater therein are held in lowest position for a predetermined time.

4. In a machine for forming painting shields for three-dimensional ornaments from plastic sheet material, in combination, a surface on which at least one ornament serving as a mold is supported, a two piece frame mounted for vertical reciprocatory movement toward and away from said surface, means urging said frame away from said surface, said frame pieces being hinged together and

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adapted to hold a plastic sheet therebetween, a hood mounted above said frame for vertical movement toward and away from said table, a heating element mounted in said hood, pneumatic means for moving said hood downwardly into contact with said frame, said heater thereby heating a plastic sheet in said frame, means for moving said frame with said hood to cause said heated plastic sheet to make contact with said mold ornament, means for sealing the space beneath said frame as it moves into position adjacent said surface, solenoid means for operating said pneumatic means and means for automatically operating said solenoid means in timed sequence to cause said pneumatic means to lower said hood into contact with said frame, lower said hood and frame together, stop with said hood in contact with said frame and said plastic sheet exposed to heat from said heating element, lower said hood and frame together until said frame is latched to said surface, evacuate the space between said sheet of plastic and said surface and initiate restoring movement of said hood to its upper position.

5. A machine in accordance with claim 4 wherein said automatic timing means comprises a manually operable reset switch, a motor driven contact arm and a contact pair in the path of said arm, said motor being energized when said reset switch is closed after being opened, said motor energization initiating movement of said contact arm toward contact closing position, said contacts being closed by said contact arm a predetermined interval after energization of said motor, said motor then maintaining said contacts closed until said reset switch is again operated deenergizing said motor and restoring said contact arm to initial position, the closing causing reenergization of said motor and repetition of the cycle of operation.

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