March 25, 1969 G. F. HUFF ET AL 3,434,458

SPRAY COATING APPARATUS

Filed March 23, 1966

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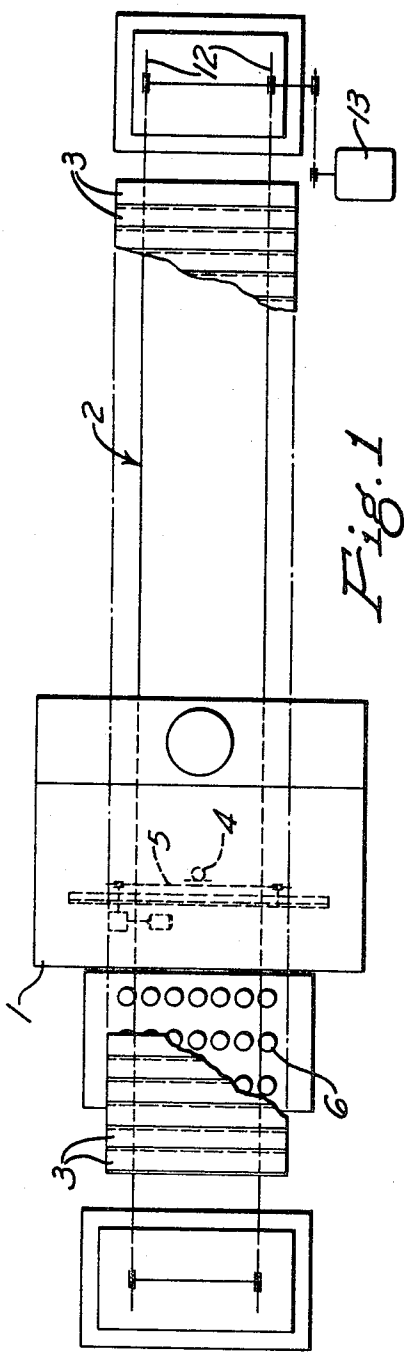


Fig. 1

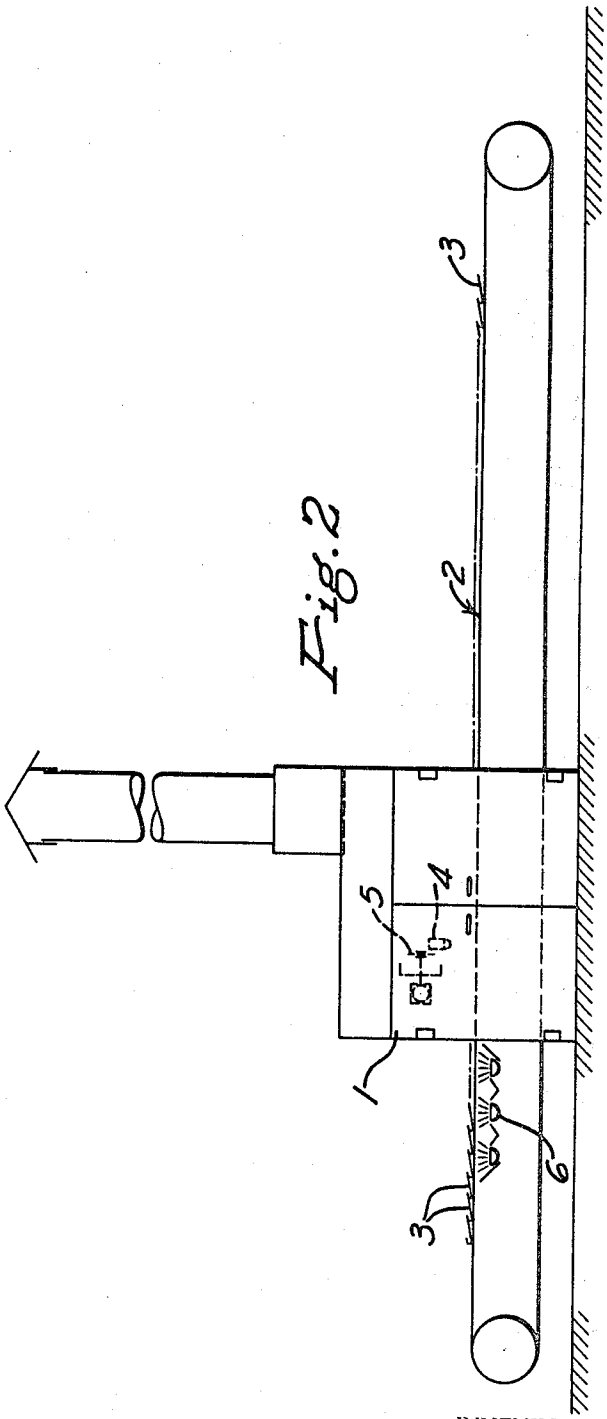


Fig. 2

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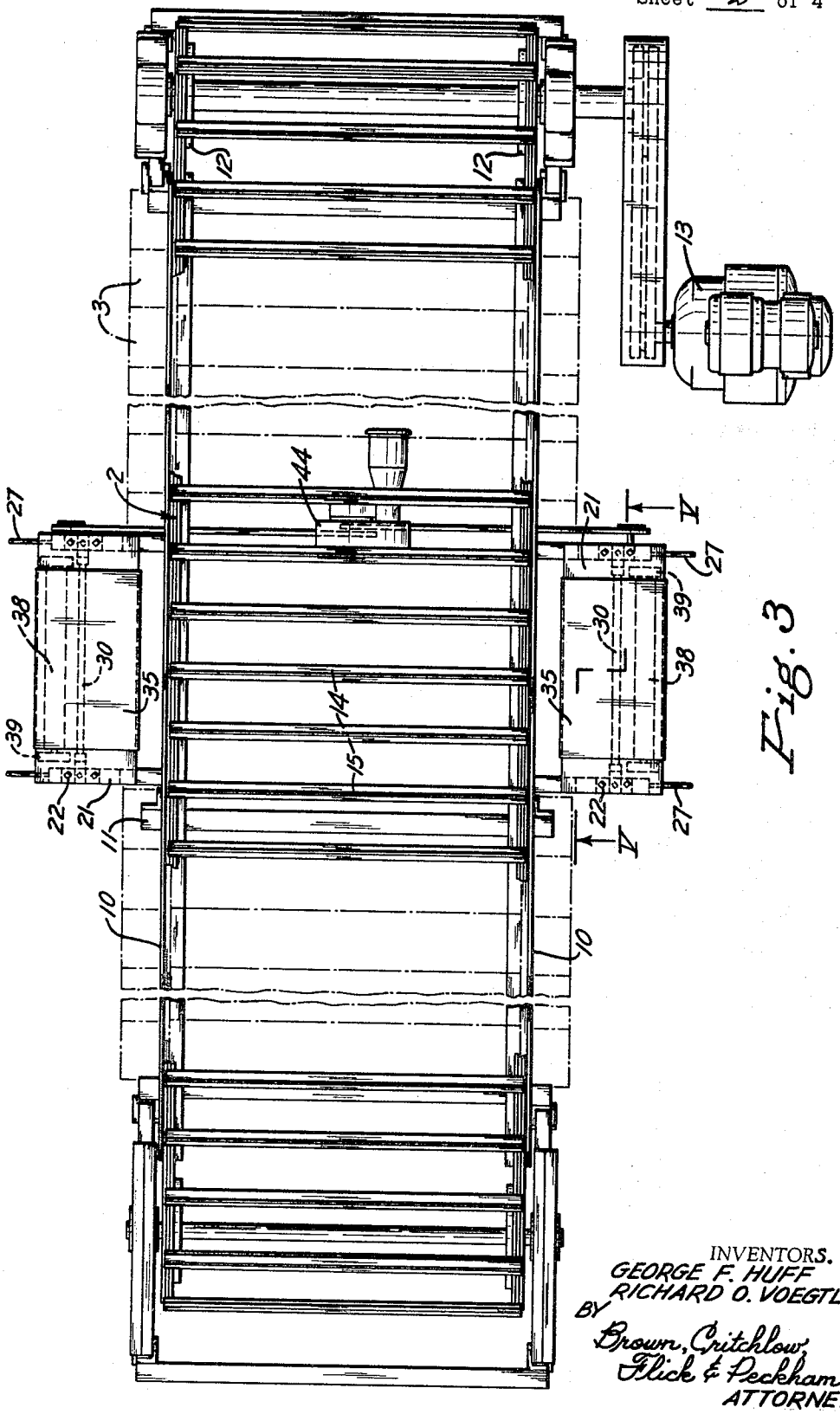


Fig. 3

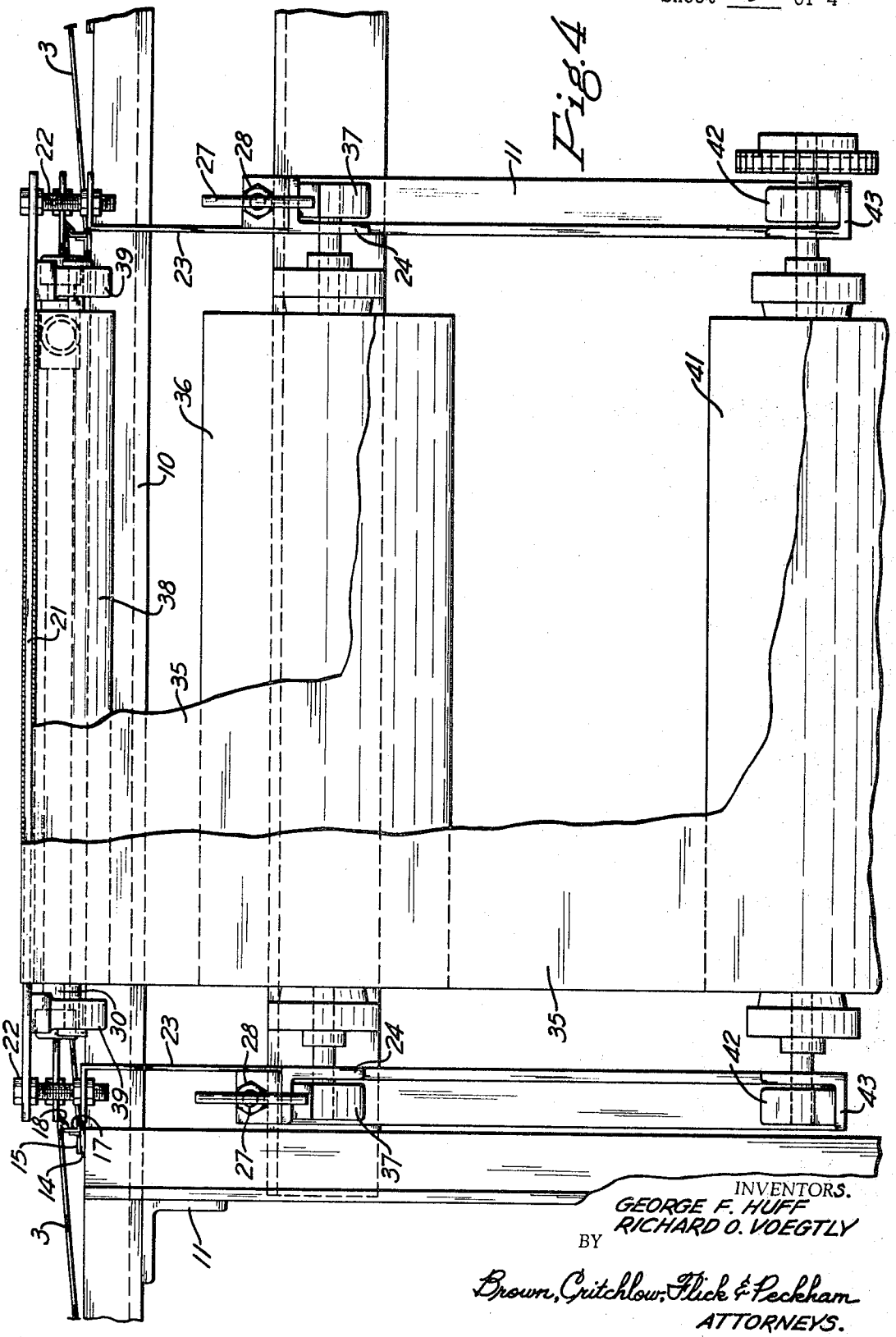
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Fig. 4



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Filed March 23, 1966 Sheet 4 of 4

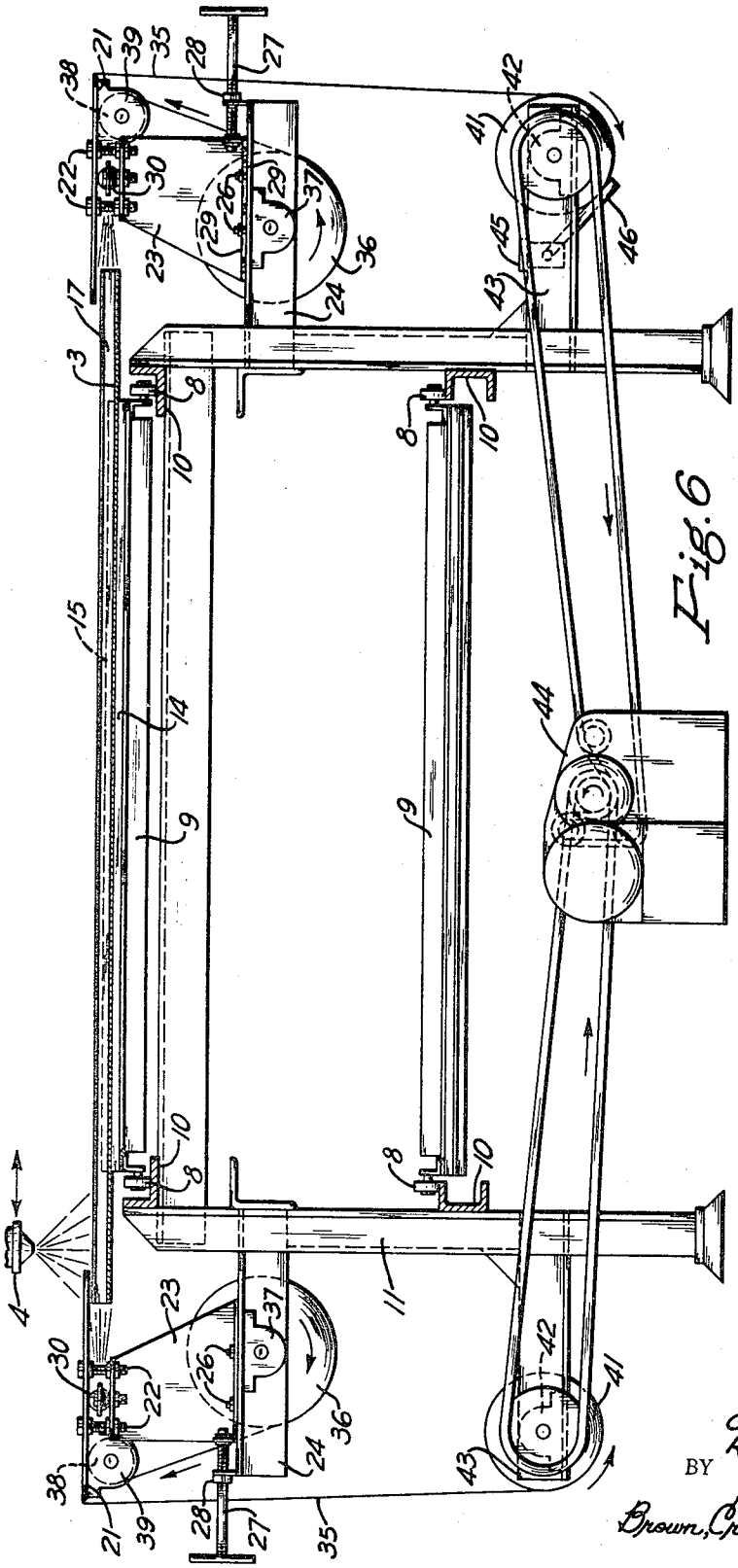


Fig. 6

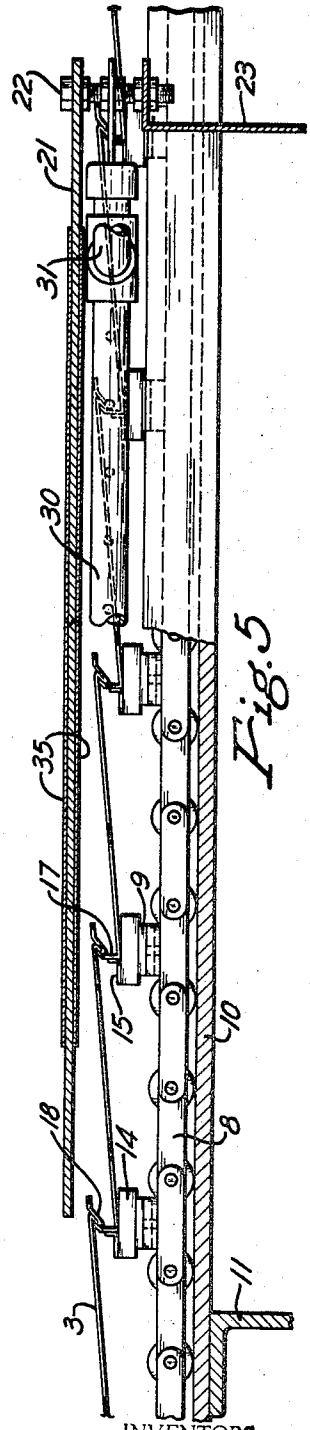


Fig. 5

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3,434,458

SPRAY COATING APPARATUS

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U.S. Cl. 118—301 2 Claims

ABSTRACT OF THE DISCLOSURE

A conveyor carries horizontal panels past a station where a coating is sprayed onto them from above. A movable strip of masking paper beside each side of the conveyor overlaps the edges of the panels to keep the spray from contacting the edge areas. The leading edge of each panel overlies the trailing edge of the panel in front of it to mask the trailing edge portion of each panel.

Various types of coatings are sprayed onto panels for different purposes. Sometimes an entire panel is coated while at other times it is desirable to leave certain marginal areas free of the coating. Thus, when a layer of thermal insulation is sprayed onto a panel that is to be used as the siding of a building, it is desirable that the insulation be spaced from at least one end of the panel to permit adjoining panels to be overlapped in engagement with one another. Also, it often is necessary that the insulation be spaced from at least one longitudinal edge of the panel so that it will not interfere with connection of that panel to an adjoining one. Although such panels can be sprayed individually, it is much more economical to spray them as they are carried through a spray booth by a conveyor.

It is among the objects of this invention to provide apparatus for spraying a coating onto a succession of panels traveling continuously past a spray sation, in which the edges of adjoining panels can be overlapped in a manner to mask a marginal portion of the overlapped panel from the spray, in which at least one end of each panel is masked from the spray, in which the coating that accumulates on the masking device is automatically carried away from the panels and disposed of, and in which spray is prevented from entering between the masking device and the panels.

In accordance with this invention, a conveyor is provided for carrying a succession of generally horizontal panels past a station where a coating is sprayed onto them from above. Beside the conveyor there is a generally horizontal plate having an edge portion that will overlap a marginal portion of a panel on the conveyor in closely spaced relation with the panel. A strip of masking material from a roll beneath the plate is guided from the roll upwardly to the bottom of the plate and then extends inwardly along the plate toward the conveyor and up around the inner edge of the plate and then out across the top of it. Means are provided for pulling the strip outwardly across the top of the plate. The sprayed material that accumulates on the strip near the inner edge of the masking plate is therefore carried outwardly away from the conveyor by the strip, from which the deposit can be removed or will separate automatically upon reaching the outer edge of the masking plate. Sprayed material may be prevented from entering the narrow space between the bottom of the masking plate and the top of the underlying panel by means of a current of air directed inwardly between those two members.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which:

FIGS. 1 and 2 are diagrammatic plan and side views, respectively, of my coating apparatus;

FIG. 3 is an enlarged fragmentary plan view of the conveyor and masking apparatus;

FIG. 4 is a further enlarged fragmentary side view of the conveyor, showing the masking apparatus at that side;

FIG. 5 is an enlarged fragmentary vertical section taken on the line V—V of FIG. 3; and

FIG. 6 is a vertical cross section through the conveyor, showing the masking apparatus in elevation.

Referring to FIGS. 1 and 2 of the drawings, the coating apparatus includes a spray booth **1**, through which an endless conveyor **2** extends. The conveyor is designed to convey panels **3** through the booth continuously, a coating being applied to the upper surfaces of the panels by suitable spray equipment as they pass through the booth. The spray equipment, which forms no part of this invention and is well known, includes a downwardly directed spray nozzle **4** that is carried back and forth across the conveyor by an endless chain **5**. The spray gun is connected by suitable flexible hoses to tanks (not shown) containing coating material and compressed air. This apparatus is especially suitable for spraying urethane foam on aluminum siding panels, to which it adheres. Such foam expands as it sets and becomes rigid. To promote adhesion of the foam to the panels, they are heated just before they enter the spray booth by electric heaters **6** beneath the upper reach of the conveyor. By the time the sprayed panels have reaced the delivery end of the conveyor, the foam has set and formed a rigid layer of thermal insulation on the panels. The thickness of the layer can be controlled by the amount of foam that is sprayed onto each panel, a layer about ⅜ inch thick being found suitable for many uses.

The construction of the conveyor is shown best in FIGS. 3, 5 and 6. It includes what amounts to an endless belt formed from a pair of parallel roller chains **8** connected at suitable intervals by cross bars **9**. The roller chains travel on tracks **10** supported by a framework **11**. At the ends of the tracks the chains pass around sprockets. The sprockets **12** at the delivery end of the conveyor are driven by a variable speed electric drive **13** at the desired uniform speed. Siding panels **3** are loaded on the conveyor at its opposite ends. Mounted on top of each cross bar **9** there is a slat **14**, and mounted on top of each slat near its trailing edge there is an angle bar **15** that extends lengthwise of the slat and forms a backstop for a siding panel that is to be coated. The backstops are spaced such a distance apart that the leading edge of each panel will overlap the trailing edge of the panel ahead of it.

These panels may be made in different forms, depending upon how they are to be assembled in use and supported. The ones shown have a long flat body and, as shown in FIGS. 4 and 5, the trailing edge of the body is bent upward to form a locking flange **17** that will extend along the bottom of the panel when it is installed and incline the panel downwardly away from the support to which its upper edge is attached. The free edge of this flange is bent to hook under a longitudinal hook **18** on the panel installed below it, the hook being formed by bending a portion of that panel near its leading edge outwardly and downwardly upon itself. The panels shown in FIG. 5 are assembled in the same way that they are assembled on the side of a building, except that they would be hung with their leading edges horizontal and at the top. The portion of each panel between its hook **18** and leading or upper edge serves as a nailing flange. With this arrangement of the panels on the conveyor, the leading edge portion of each panel masks the underlying trailing portion of the panel ahead of it from the material being sprayed onto the panels, and thereby prevents the resulting coating from interfering with hooking the panels together when they are

assembled on a building. Some spray may accumulate beneath the panel hooks, but not in sufficient volume to interfere with the connection.

Another feature of this invention is that one or both ends of each panel can be protected from the spray coating so that the ends of adjoining panels can be overlapped in metal-to-metal engagement. The drawings show apparatus for masking both ends of the panels for this purposes, but since the two masking devices are identical, only one will be described. Both are inside the spray booth. The masking apparatus includes a masking plate **21** which is substantially horizontal. It is located at one side of the conveyor at an elevation slightly above the level of the panels. The plate is supported by bolts **22** rigidly mounted in its opposite sides and extending down into the upper ends of a pair of parallel brackets **23** rigidly mounted on arms **24** projecting outward from the side of the conveyor framework **11**. The bolts can be adjusted vertically in the brackets to vary the spacing between the masking plate and the panels.

The plate also is adjustable toward and away from the conveyor so that its inner edge can overlap the end of a panel any desired distance, such as an inch or two. This adjustment may be made by loosening the bolts **26** by which the brackets are secured to arms **24**, and then turning horizontal adjusting screws **27** that are rotatably mounted in the brackets and threaded in nuts **28** fastened to the outer ends of the arms. The bottoms of the brackets are provided with slots **29** that permit the brackets to move on bolts **26**. When the spray nozzle moves along a panel to its end, the overlapped portion of the panel will be shielded or masked by the overlying portion of the plate and thus protected from the spray as shown in FIG. 6.

To prevent the spray material from blowing out through the gap between the masking plate and the panel, a current of air is blown continuously inwardly through the gap. This current of air may be produced by closely spaced jets of air issuing from a horizontal pipe **30** adjustably mounted on brackets **23** and connected by a hose **31** (FIG. 5) with a suitable source of compressed air. The pipe may be adjusted vertically and toward and away from the conveyor to obtain the best possible result.

Since the spray coating would build up a highly undesirable accumulation on the inner end portion of the masking plate if nothing were done to remove it, means is provided for continuously removing the deposit. This is done by means of a traveling strip **35** of masking material, such as paper, plastic or fabric, but which will be referred to hereinafter as paper. In fact, paper is probably the most economical material to use. A supply roll **36** of the masking paper is mounted in bearings **37** supported by the arms **24** below the masking plate. The paper strip extends from this roll up around the outer side of a guide roll **38** journaled in bearings **39** attached to the bottom of the outer end of the plate. This roll is close to the plate and the paper strip extends from it inwardly along the bottom of the plate and then up around its inner edge and back out across the top of the plate.

Means are provided for pulling the paper outwardly across the top of the plate so that the foam accumulating on it will be carried away from the inner edge of the plate. Such pulling means most suitably is a takeup roll **41** mounted in bearings **42** on a pair of arms **43** projecting laterally from the lower part of the conveyor framework. The paper therefore extends down across the sharp outer edge of the masking plate to this roll, which is driven from a driving unit **44** mounted beneath the conveyor, the unit being so constructed that it drives the two takeup rolls in opposite directions. A constant paper speed of about three or four inches per minute can be maintained by means of a compensating device **45** mounted on one of the arms **43** and provided with a pivoted lever **46** engaging the periphery of the adjoining takeup roll. As the diameter of the roll increases, the resulting movement of the lever will reduce the current supplied to driving unit **44** and thereby reduce the speed of rotation of the takeup rolls.

As the layer of foam that accumulates on the traveling masking paper reaches the outer edge of the masking plate, it will continue to move laterally away from the plate as the paper separates from it and travels down to the takeup roll. To assure good separation, it is preferred that the paper be waxed. The rigid layer of foam leaving the masking plate can be knocked or cut off periodically by any suitable means. Or, it can break away under its own weight. To facilitate breaking, the drive for the takeup rolls may have built into it a well-known mechanism that periodically speeds up the drive for a moment. When the masking paper is periodically moved at a higher speed for a short distance, there will be less accumulation of foam for that distance and therefore thick areas of foam will be connected by thin areas which will readily break when they reach the outer edge of the masking plate, due to the thicker and heavier layer of foam projecting outwardly beyond the plate.

It therefore will be seen that with this apparatus the backs of aluminum siding panels can be provided with rigid layers of foam plastic for insulation purposes, but the foam is prevented from being deposited near the lower edges of the panels and along their ends. Thus, the insulation does not interfere with connecting the various panels side by side and end to end. The operation is entirely automatic after a panel has been loaded onto the conveyor. In fact, they can be loaded and unloaded automatically too.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment.

We claim:

1. The combination with a conveyor for carrying a succession of generally horizontal panels past a station where a coating is sprayed onto them from above to form a hardened layer of foamed plastic, of masking apparatus for marginal areas of such panels during spraying comprising a generally horizontal plate beside the conveyor and having an inner edge portion adapted to overlap a marginal portion of a panel on the conveyor in closely spaced relation therewith, a roll of masking paper beneath the plate, means for guiding the paper from the roll upwardly to the bottom of said plate, the paper extending from said guiding means inwardly along the plate toward the conveyor and up around the inner edge of the plate and then out across the top of the plate, means for pulling the paper outwardly continuously across the top of the plate, and means for periodically increasing the speed of said pulling means momentarily.

2. In the combination recited in claim **1**, said paper-pulling means being a continuously driven roll on which the paper winds, and means for gradually reducing the normal speed of rotation of said driven roll as the paper is wound thereon.

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U.S. Cl. X.R.

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