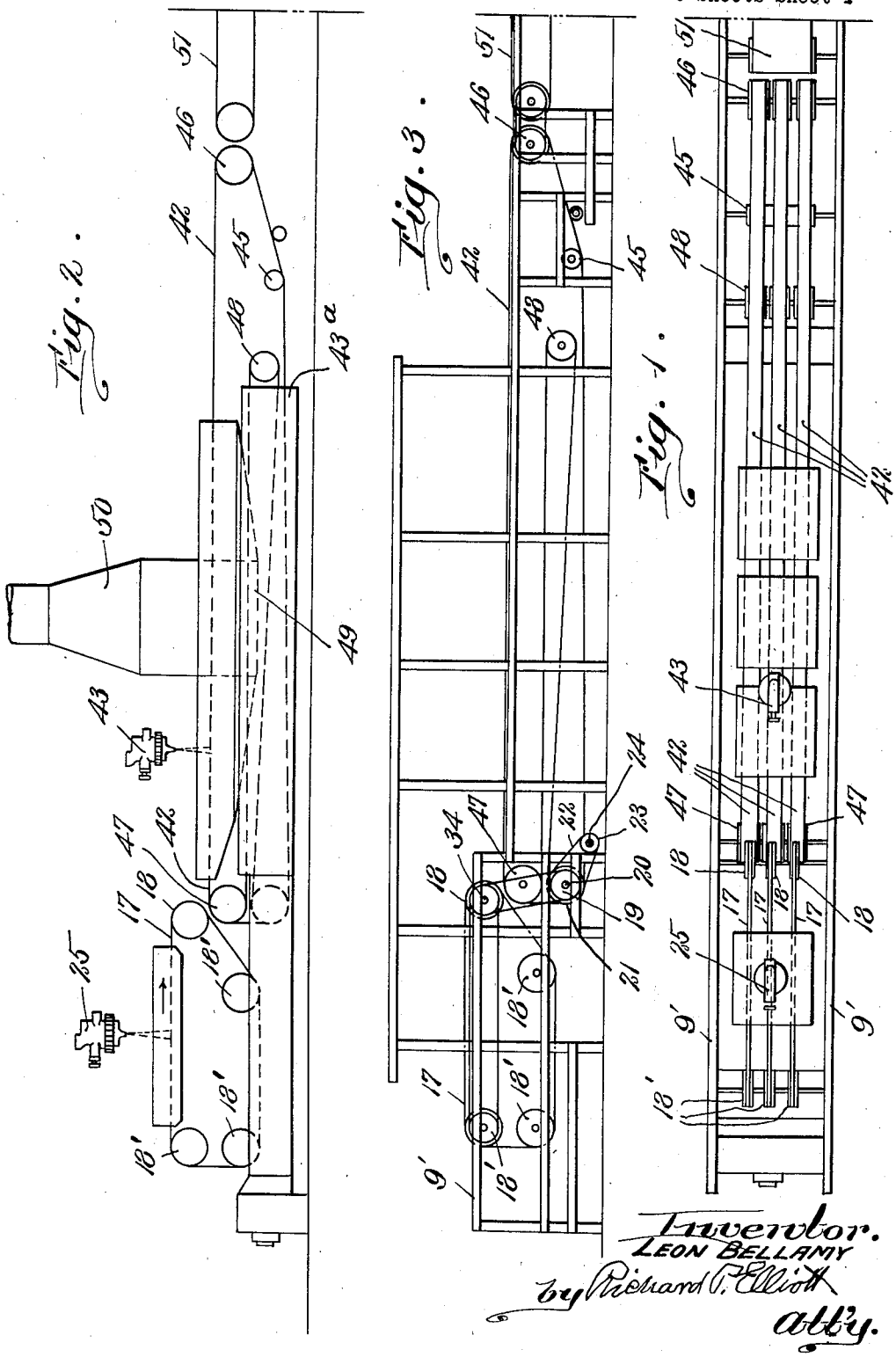
Aug. 25, 1936. L. BELLAMY 2,051,813

MACHINE FOR COATING MATERIALS

Filed March 28, 1934 3 Sheets-Sheet 1



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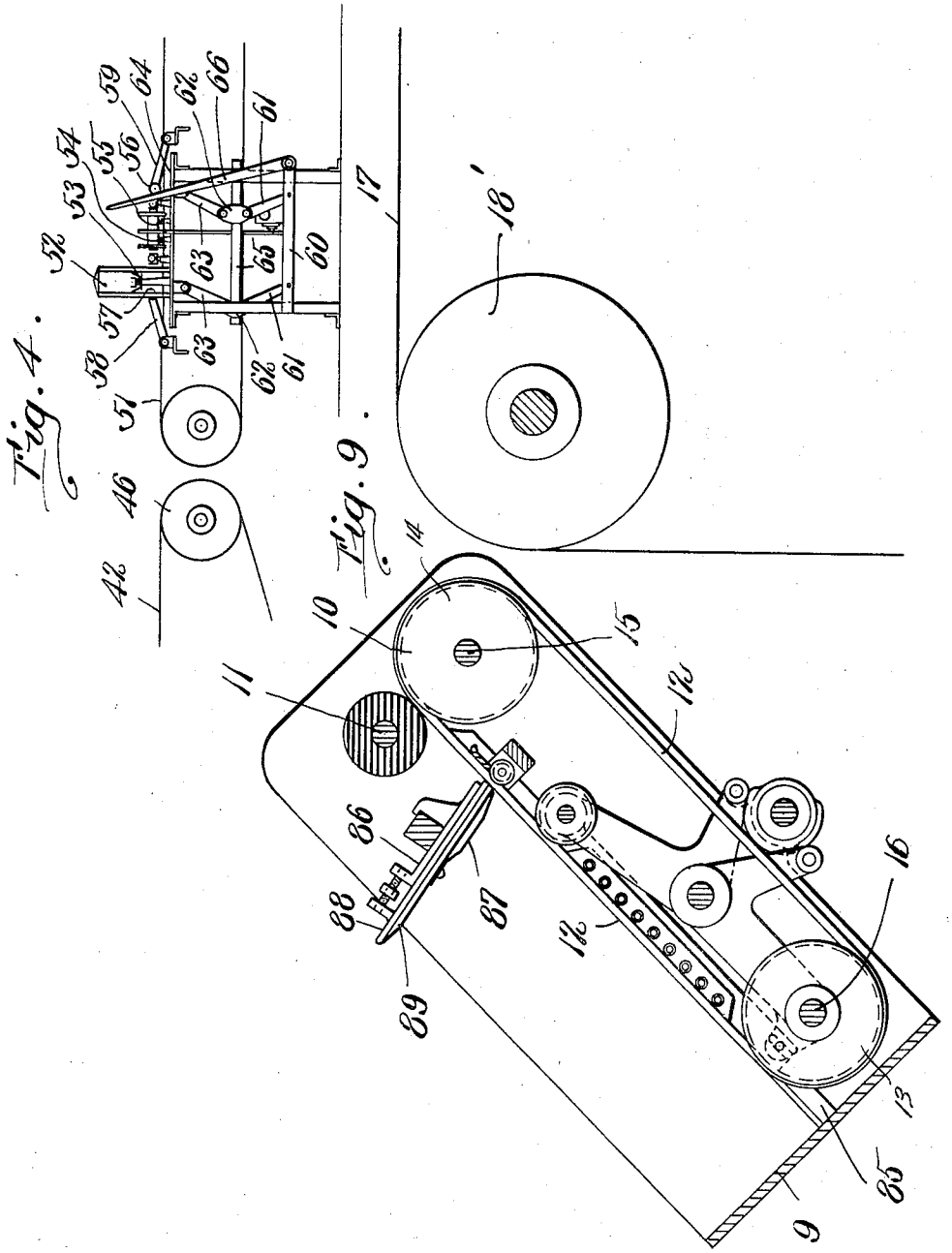
Filed March 28, 1934 3 Sheets-Sheet 2



Inventor
LEON BELLAMY
by Richard P. Elliott
Atty.

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Filed March 28, 1934 3 Sheets-Sheet 3

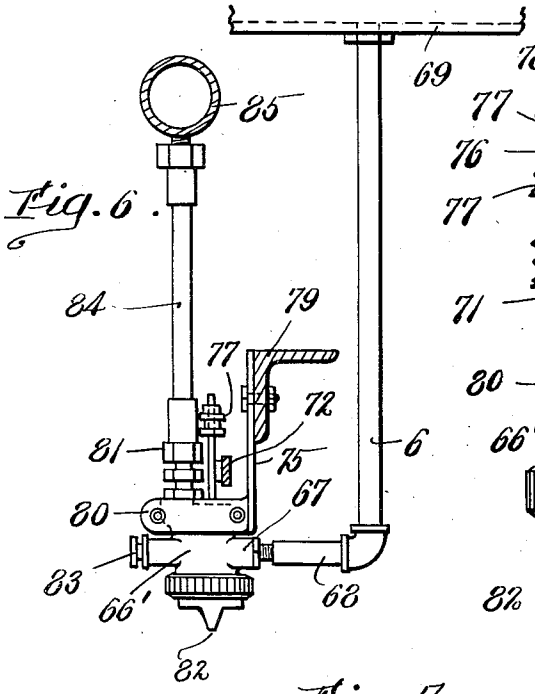


Fig. 6.

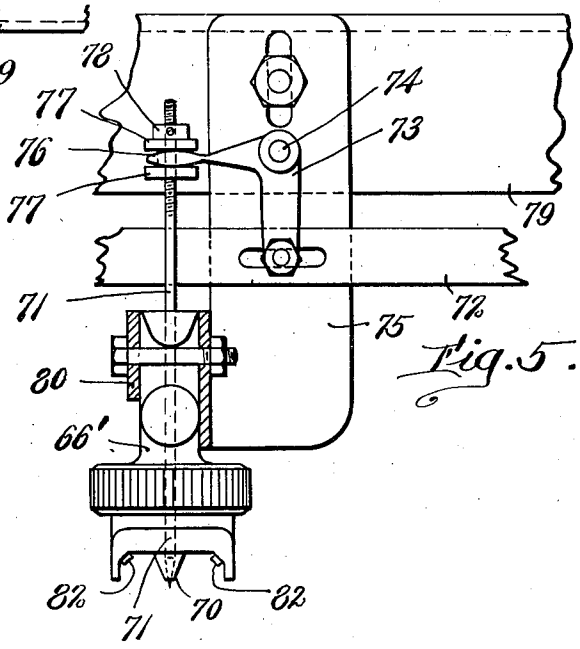
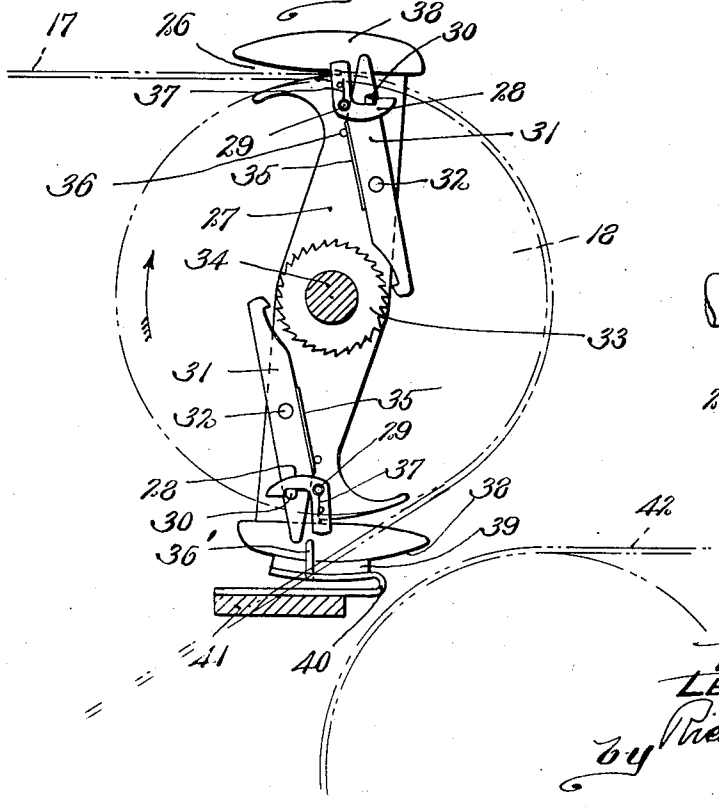


Fig. 5.

Fig. 7.



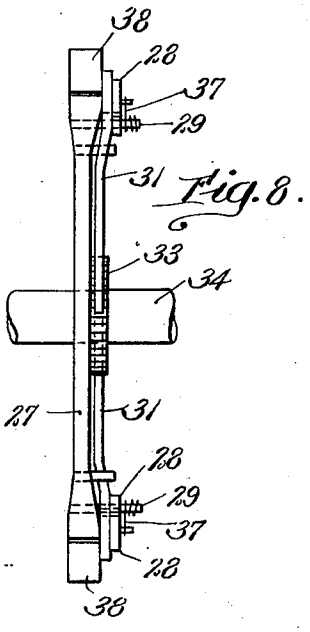


Fig. 8.

Inventor.
LEON BELLAMY
by Richard P. Elliott
Atty.

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MACHINE FOR COATING MATERIALS

Leon Bellamy, Newton, Mass.

Application March 28, 1934, Serial No. 717,818

3 Claims. (Cl. 91—45)

My invention relates to machines for coating sheets of materials with a liquid coating mixture.

The objects of my invention are as follows:

To provide a coating machine for coating the surfaces of matrix paper evenly with a liquid mixture, by the use of spray devices adapted to project an elongated fan shaped jet of the liquid mixture upon the surfaces to be coated; to provide devices to feed successive sheets of matrix paper from a stack of such sheets to conveyers which feed the sheets of materials under the spray devices at varying speeds; to provide means to adjust the spray devices to project liquid coating mixtures of varying viscosity and at different velocities; to provide devices for turning the sheets of materials over to coat both sides if desired and a device to evenly cover the surface of the sheet of matrix paper with a pulverized material in a powdered form.

A further object of my invention is to so construct the feeding mechanism and spray coating device as to vary the thickness of coating projected upon the surface of the sheets of materials.

These objects are attained by the mechanism illustrated in the drawings forming a part of these specifications.

In the drawings Fig. 1 is a diagram of the plan view of my improved coating machine. Fig. 2 is a side elevation of same. Fig. 3 is a side elevation showing more in detail the arrangement of the conveyor belts and the means for driving the same. Fig. 4 is a diagrammatic side elevation of the feeding device for feeding the sheets from a stack of sheets to the conveyer belts and the device for covering the sheets with powdered material. Fig. 5 is an enlarged elevation of the spray device and support. Fig. 6 is a sectional elevation of the support for the spray device, the bottom of the tank for holding the coating mixture, a section of air pipe for compressed air, the connections to the tank and air pipe and a side view of the spray device. Fig. 7 is a side elevation of the device for turning over the sheets of matrix paper and Fig. 8 is an edge view of same. Fig. 9 is an enlarged sectional elevation of the feeding mechanism, as shown in my copending application, Serial No. 717,817 filed March 28, 1934, for Machine for coating materials, in which its construction is fully described. This feeding device is not attached to the frame of the machine shown in Figs. 1 and 2 of this application, but is preferably operated from an independent source of power, with its feeding belts timed to the same surface speed as the carrier belts shown in Figs. 1 and 2. Fig. 9 shows the position of the feeding device with relation to the carrier belts of the machine when it is positioned to feed sheets to the machine.

In the drawings, 9 represents a feeding device in which sheets of paper or the like may be stacked, preferably at an angle and fed from the bottom upwardly through the rolls 10 and 11. The sheets are fed by the feeding belts 12—12 which are V shaped and are driven and guided by the two series of pulleys 13—13 and 14—14 which are mounted upon and rotated by the shafts 15 and 16, which rotate in bearings in the frame 9. The shaft 15 may be rotated by a suitable source of power.

The sheets are passed from the feed belts 12—12 to a series of V shaped conveyer belts 17—17 which are mounted upon and driven by the pulley 18, the pulleys 18'—18' are idler pulleys. The pulley 18 is driven by belts from the pulley 19, which is mounted on the shaft 20. The pulley 21 is mounted upon the shaft 20, and driven by the belt 22, which is mounted upon and driven by the pulley 23, which pulley is mounted upon the shaft 24. The shaft 24 is rotated by a motor or other suitable source of power.

As the sheets are conveyed in the direction of the arrow by the belts 17—17 they pass under the spray device 25, and their exposed surface moistened by a fan shaped spray of water is desired. When the forward edge of the sheets pass to the pulley 18, they enter the wedge shape space 26, of the turning over device shown in Fig. 7. Contact with the trigger 28 causes it to rotate on its pivot 29, and disengage its hooked portion from the pin 30. The disengagement of the trigger 28, from the pin 30, permits the ratchet pawl 31 to swing upon the pivot 32, and cause its hooked portion to engage the ratchet 33 which is secured to and rotates with shaft 34, thereby causing the turning over device to rotate with the shaft 34 half a revolution. The ratchet pawl 31 swings upon the pivot 32, into engagement with the ratchet 33, through the action of the spring 35, secured to it; the free end of the spring engages the pin 36. The spring 35 is normally curved outward so that it is under sufficient tension to swing the ratchet pawl 31, into engagement with the ratchet 33. When the turning over device 27 has completed a half revolution, its outer end contacts with the pin 36', thereby disengaging its hooked end from the ratchet 33, at the same time the spring 35 is compressed and the trigger 28 engages the pin 30, through the action of the spring 37. After the ratchet pawl 31 is disengaged from the ratchet 33, the portion

38 contacts with the brake surface 39, which is mounted on the yielding spring 40, secured to a cross member 41 of the frame 9'. The contact of the brake surfaces 38 and 39 brings the turning over device into position so the V shaped opening in the oppositely disposed member of the turning device is in position to receive the advancing edge of the next sheet. The turning over device 27 is composed of oppositely disposed duplicate members and is loosely mounted on the shaft 34.

The sheets of material as turned over are deposited on a second series of conveyor belts 42—42 which convey them under the spray device 43, which projects on their upper surfaces a fan shaped jet of coating mixture extending laterally across the sheets as they are fed along, thus evenly coating the whole surface of each sheet. The thickness of the coating is regulated by varying the composition and viscosity of the coating mixture; the speed at which the sheets travel; by varying the opening of the jet orifice and by varying the velocity at which the coating mixture is projected from the jet orifice.

It is essential that the conveyor belts 42—42 be dry and free of coating mixture when the sheets drop upon them as turned over. To this end I provide means for scraping the top surface of the belts not shown and pass them through the drying chamber 43a, the conveyor belts 42 are long enough to pass through the chamber 43a, several times, they are driven by the pulleys 21—21 mounted on the shaft 20, the conveyer belts 42 pass over the pulleys 21—21 around pulleys 48—48, over pulleys 47—47 to pulleys 46—46, thence to pulleys 45—45 and back to pulleys 21—21.

A pan 49 is provided to catch and hold any coating mixture not deposited on the sheets as they pass under the spray device 43, and an enclosure 50 is provided with an exhaust fan, not shown, to draw out free moisture and help dry the sheets.

The sheets of material pass from the conveyer belts 42—42 to the conveyer belt 51, which is substantially the width of the sheets and are conveyed by the belt 51, under a dusting device consisting of a hopper 52, for holding a pulverized material. The bottom of the hopper 52 has a narrow opening covered with wire mesh. There is a brush 53 mounted in the hopper 52, with its bristles resting on the wire mesh and means are provided, not shown, to reciprocate the brush 53, endwise to feed the pulverized material through the wire mesh so it will fall upon the sheets as they pass through under the hopper 52. Two reciprocating brushes 54 and 55 are provided to spread the pulverized material over the surface of the sheets as they are fed under them and rub it into pores of the sheets.

Rolls 56 and 57 are provided to prevent displacements of the sheets while the brushes 54 and 55 are rubbing against their surfaces, they hold the sheets down against the conveyor belts 51. The rolls 56 and 57 are mounted to rotate in the ends of the reciprocating levers 58 and 59, which in turn are pivoted to the frame of the machine.

At times it is desirable to dispense with dusting the surfaces of the sheets, in such event means are provided to stop the operation of the dusting device and elevate it out of contact with the surface of the sheets. They consist of the cross bar 60, to which the ends of the levers 61—61 are pivoted at one end, their other ends are pivoted to the links 62—62. The levers 63—63 are pivoted to the links 62—62, at their lower ends, their upper ends are pivoted to plates 64, located on either side of the frame 9'. The hopper and brushes of the dusting device are mounted on the plates 64. A connecting bar 65 is attached to the links 62—62, and a lever 66 is pivoted at its lower end to the frame 9', and at its mid portion to the connecting bar 65, by moving the top of the lever 66 to the right, see Fig. 4. The levers 61—61 and 63—63 will assume a perpendicular position thus elevating the plates 64 and the dusting device out of contact with sheets of material passing through under the brushes. The brushes 54 and 55, are provided with means, not shown, to reciprocate them crosswise of the sheets to spread and rub in pulverized material dusted upon the surface of the sheets. Figs. 5 and 6 illustrate the spray devices 25 and 43. The spray devices consist of the body part 66', which is provided with the portion 67, serving as a connection for the pipes 68, through which the coating mixture flows from the tank 69, to the spray device. Passages not shown are provided extending through the body part 66', from the connection 67, to the orifice 70, a needle valve 71 is provided to regulate the flow of coating mixture through the orifice 70, and to close said orifice.

Means are provided to open and close the needle valve 71, and to regulate the extent of its opening, consisting of the longitudinally slidable bar 72, to which is pivoted the bell crank lever 73, by the pivot 74, secured to the support 75. The end 76 is forked to embrace the valve stem 71, threaded nuts 77—77 are mounted upon the needle valve 71, and adjustable thereon. They are held in position by the check nut 78, as will be noted. Longitudinal movement of the bar 72 will move the needle valve stem 71 to open or close the orifice 70.

The support 75 is secured to the cross bar 79, which is a part of the frame 9' of the machine. The spray device is secured to the support 75, by means of the clip 80 and bolts.

The spray devices 25 and 43 are provided with an air connection 81, and passages, not shown, leading from the air connection to outlets 82—82. A valve 83 is provided to control the volume and pressure of air flowing from the outlets 82—82. The connection 81 is attached to the pipe 84, which is secured in the air supply pipe 85.

The operation of coating materials is as follows: A stack of sheets is placed upon the feeding belts 12, and fed from the bottom through the feed rolls 10, and 11, to the conveyer belts 17—17, and thence under the spray device 25, which projects a jet of water to cover its exposed surface, the sheets then pass to the turning over device 27, and turned over to fall upon the conveyor belts 42—42 and conveyed by them under the spray device 43, which projects upon its exposed surface a coating mixture, the thickness of the coating being regulated by the speed at which the conveyor belts 42—42, travel and the volume and velocity at which the coating mixture is projected from the orifice 70. After being coated the sheets pass through the exhaust dryer 50, thence to the conveyer belts 51—51, and conveyed by them under the dusting tank 52, and the two reciprocating brushes 54 and 55. The brushes 54 and 55 serve to spread the powdered material over and rub it into the surface of the sheets of materials. By elevating the dusting device the coated sheets will pass under it without dusting.

Referring to Fig. 6, it will be noted that the

air outlets 82—82 are positioned at an angle so that jets of air projected therefrom will impinge on either side of the jet of coating mixture and against each other, the combined action of the three jets results in a fan shaped jet of coating mixture that will extend laterally across the sheet and evenly cover its surface as it is fed under the spray device.

Fig. 9 is an enlarged view of the feeding mechanism, in which there is provided supports 85, on which the sheets are placed. They are arranged so that the bottom sheet will contact with the feed belts 12—12. A hold back device 86 is provided consisting of the spring member 87, and the parts 88 and 89. The part 89 is adjusted to permit the lower sheet to pass under it. The part 88 permits the second sheet to pass under and the spring 87 is inclined at an angle so that the front edge of the sheets will settle downward without undue friction.

My invention is not confined to the exact form and arrangement of the parts as they may be changed and modified without departing from the spirit of my invention.

Having described my invention, what I claim is:

1. In a paper coating machine having a rotatable shaft mounted therein, a ratchet wheel secured to said shaft, a plurality of radial arms loosely mounted on said shaft, each provided with an outwardly tapering slot positioned to receive the advancing edge of a sheet, pawls pivoted on the radial arms and adapted to engage the ratchet by the action of springs, triggers located across the slots in the radial arms and adapted to engage the pawls and hold them out of contact with the ratchet, said triggers being operated by the advancing edge of a sheet to disengage them from the pawls and means to disengage the pawls and position the radial arms when they have completed a half revolution.

2. In a machine for moistening, coating and dusting powdered materials on the coated face of matrix sheeets, means for feeding sheets of matrix paper to horizontal carrier belts, said carrier belts, means for moistening one surface of the sheets, means operable by the advancing edge of the sheets to turn them over, means to coat the other side of the sheets, means to convey the coated sheets to a dusting device and means to evenly distribute the powdered material on the coated surface of the sheets.

3. The method of preparing matrix sheets for casting type for use in printing, which consists in moistening one surface of the sheets, turning them over and coating the other surface with a coating material and thereafter dusting onto and spreading evenly a coating of powdered material on the coated surface of the sheets all by continuous operations.

LEON BELLAMY.