

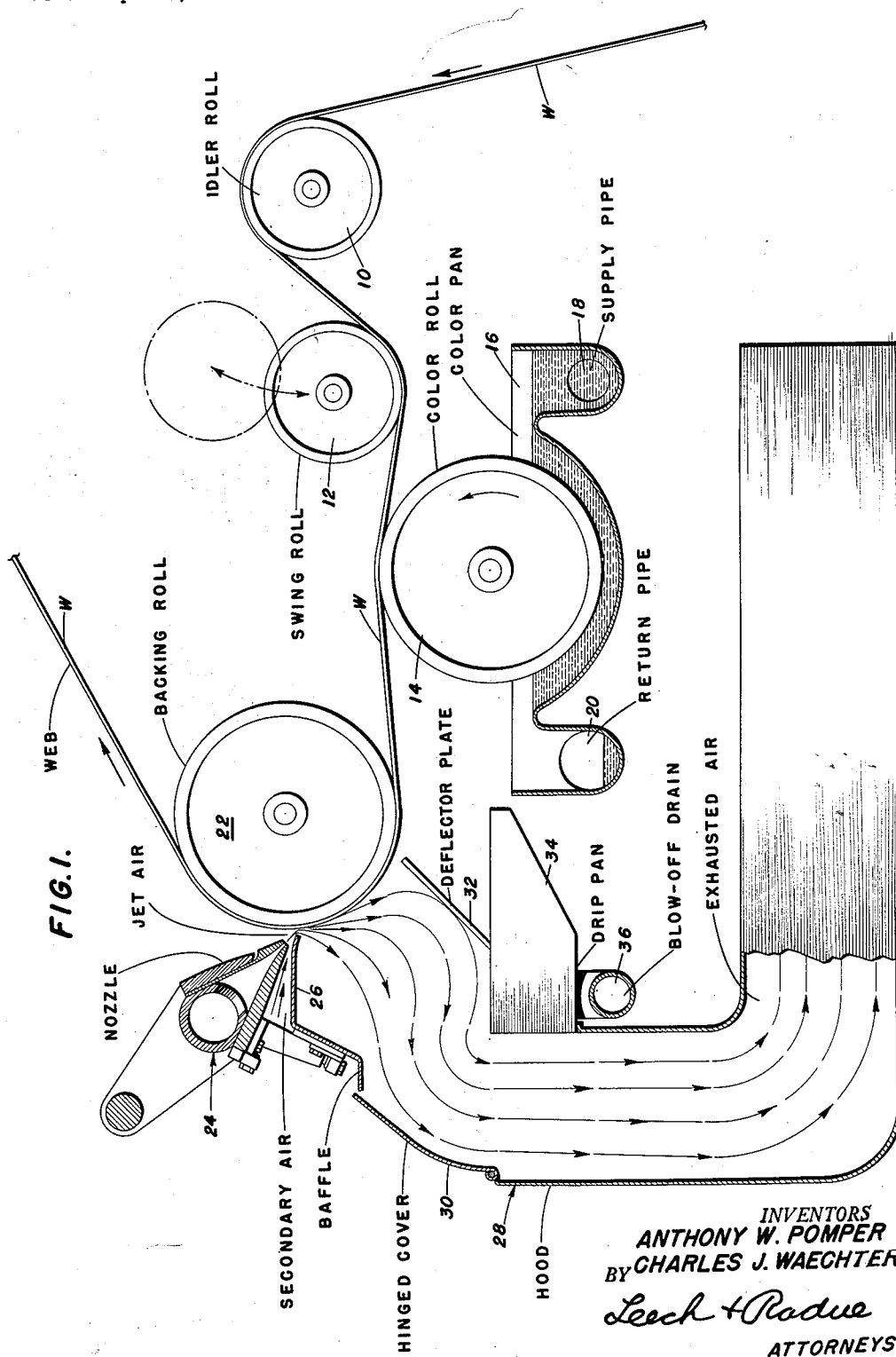
May 25, 1954

A. W. POMPER ET AL
WEB COATING APPARATUS

2,679,231

Filed Sept. 7, 1951

4 Sheets-Sheet 1



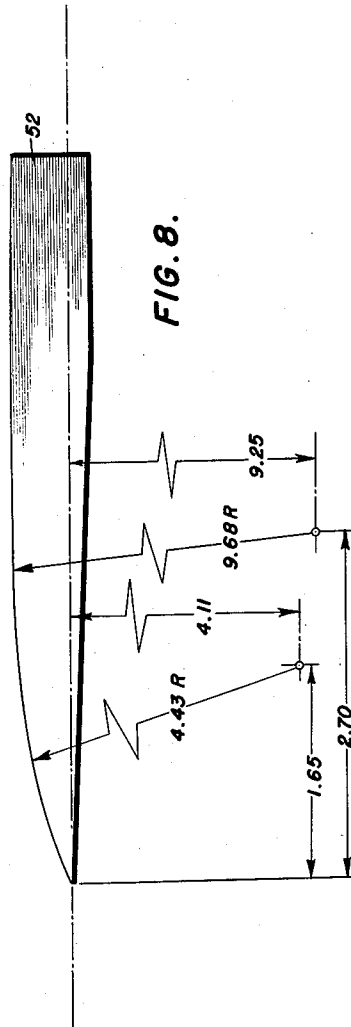
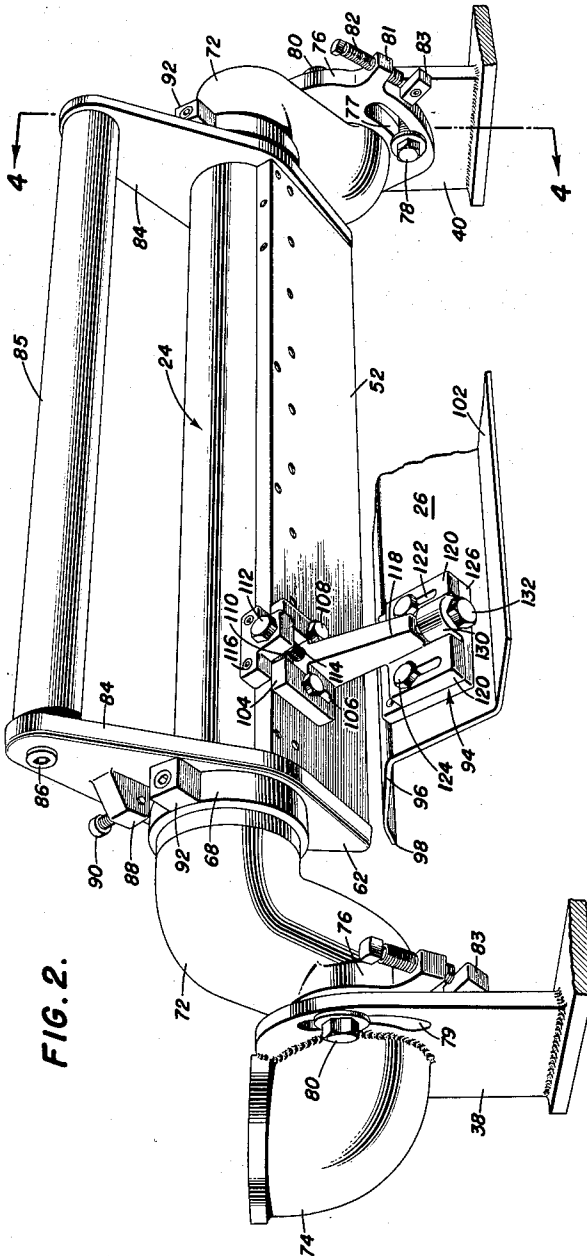
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4 Sheets-Sheet 2



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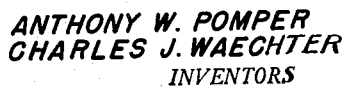
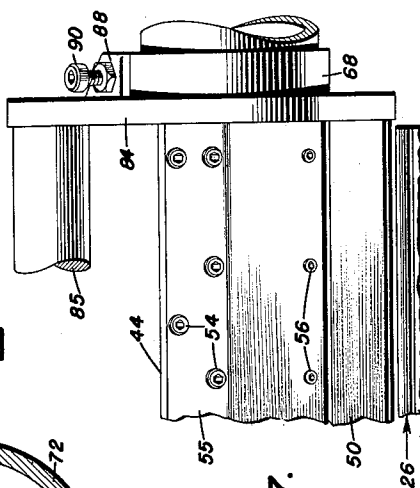
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4 Sheets-Sheet 3



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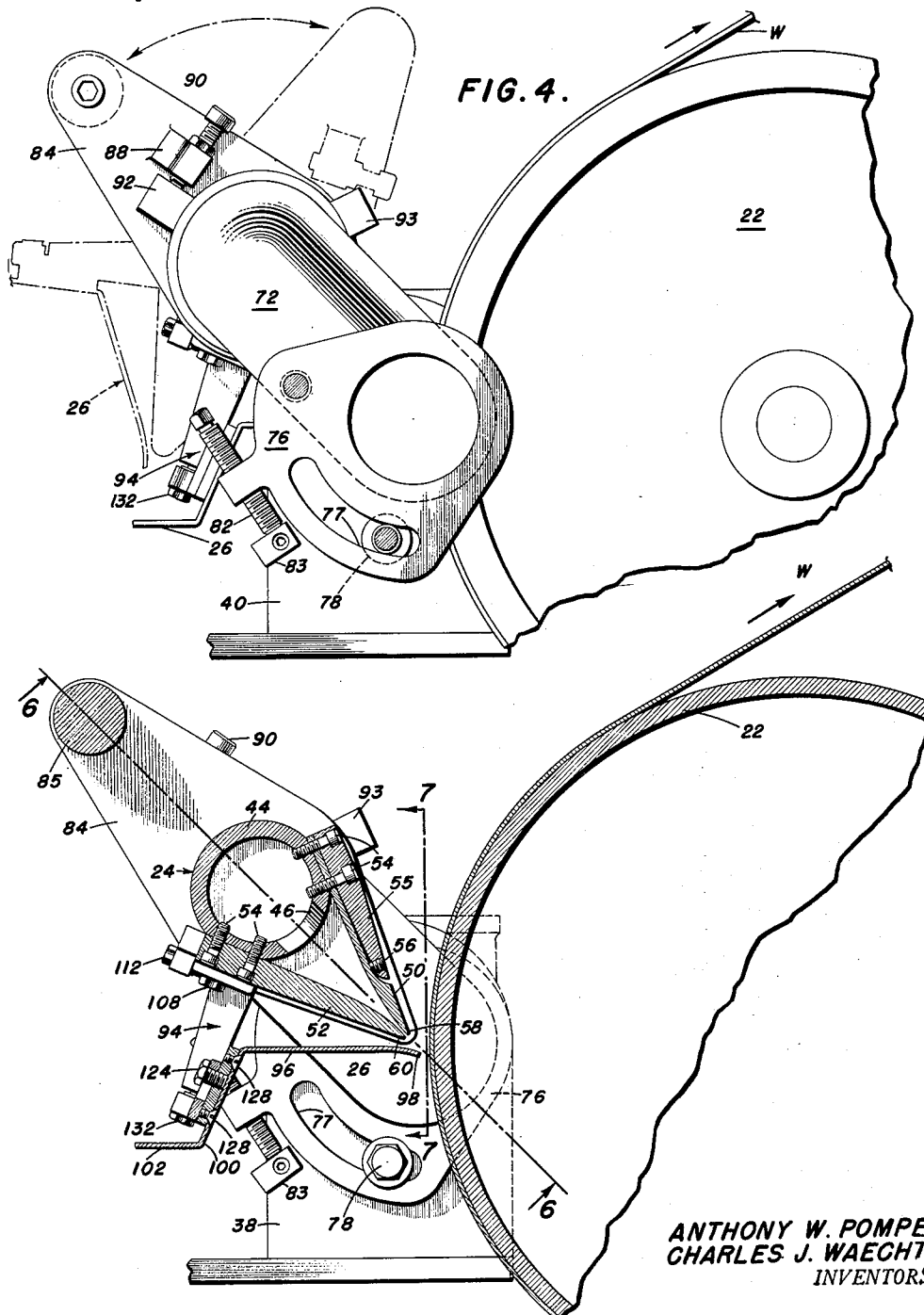
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WEB COATING APPARATUS

Filed Sept. 7, 1951

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UNITED STATES PATENT OFFICE

2,679,231

WEB COATING APPARATUS

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Application September 7, 1951, Serial No. 245,552

22 Claims. (Cl. 118-63)

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This invention relates to a web coating apparatus having an air jet nozzle, and particularly to an apparatus adapted to apply liquid coating material to a continuous web of paper. This invention is directed principally to improving the operation of the apparatus for coating webs disclosed in U. S. Patent No. 2,545,266, patented March 13, 1951, to Charles A. Dickhaut and Benjamin R. Newcomb, and assigned to John Waldron Corporation, which is also the assignee of the present invention.

In apparatus of this general type as disclosed more fully in the said patent of Charles A. Dickhaut and Benjamin R. Newcomb, liquid coating material including dissolved or suspended solids is applied to the paper web by a roll over which the web travels, said coating material being deposited in excess of the finished coating weight required. The web carrying this excess of coating material passes around a backing roll where the excess is removed by a jet of air of high velocity impinging on the surface of the web at a controlled angle. The air jet acts to remove excess coating and to smooth or even the remainder so as to produce a finished uniform coating of predetermined weight regardless of the amount of excess coating originally applied. In the apparatus of the said prior patent a baffle is mounted on the frame of the apparatus below the air jet nozzle and in predetermined relation to the nozzle and the backing roll for the purpose of deflecting a mist or fog of atomized coating material away from the lip portion of the nozzle and from the traveling paper web. Under some conditions of operation it has been found that the nozzle producing the air jet of the patented apparatus is subject to internal pulsations which causes uneven coating when applying certain weights of liquid coating material. Difficulty has also been experienced in controlling the atomized particles removed from the web during certain operating conditions. In some instances there has been an excessive buildup of atomized particles on the baffle and nozzle, resulting in streaks of uneven coating on the web. The buildup on the baffle can grow to the point where it contacts the surface of the web and seriously disturbs the action of the air jet. These difficulties cannot be completely overcome by moving the baffle away from the backing roll because then the circulating air currents carrying atomized solid particles will produce a buildup of particles around the opening of the nozzle, thus diverting the air jet stream and producing streaks of heavy coating.

The general purpose of this invention is there-

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fore to overcome the difficulties which have been encountered and to provide a coating apparatus that is more efficient and satisfactory in operation under all required conditions.

A principal object is to provide an improved air nozzle of a shape, size and construction that will substantially eliminate turbulence and produce greater uniformity of coating at higher operating efficiency. An auxiliary object resides in the provision of improved adjusting means for regulating the discharge slot opening in the air nozzle.

A further and related object is to provide an external nozzle configuration which in combination with a baffle of particular shape and disposition will effectively prevent any buildup of atomized particles on either the lip portion of the nozzle or on the baffle, and thus avoid streaks of uneven coating.

In the attainment of the previously mentioned object, it is advantageous to provide auxiliary deflecting means for intercepting the flow of expanded jet air and secondary air induced between the baffle and the nozzle at a location below the nozzle and the baffle, and thus insuring against particle deposit on the baffle or web.

A more specific object of the invention resides in the provision of means mounting the baffle on the nozzle for joint movement into and out of operative relation to the web without requiring removal or interference with adjustment of the baffle.

It is also a specific object of the invention to improve the movable nozzle assembly by the addition of counterbalancing means to provide simpler and more efficient means for making and maintaining the angular spacing adjustment of the nozzle in its operative position.

An additional object is to provide improved means in the form of sealing rings for mounting the nozzle for axial rotation.

These and other objects contributing to efficiency in operation, ease of adjustment, and satisfaction in use will be more fully understood from the following detailed description of a preferred embodiment of the invention, taken in connection with the accompanying drawings, in which:

Fig. 1 is a schematic side elevation of a web coating apparatus according to this invention, with some of the parts shown in cross section;

Fig. 2 is a side perspective view of an air nozzle assembly in approximately operative position and having some parts broken away;

Fig. 3 is an enlarged fragmentary side elevation of one end of the nozzle assembly of Fig. 2;

Fig. 4 is a fragmentary and partially sectioned end elevation of the nozzle assembly and the web backing roll as viewed in the direction shown by line 4—4 of Fig. 2;

Fig. 5 is an enlarged section of the nozzle assembly in operative position, taken along the line 5—5 of Fig. 3 and including a part of the backing roll;

Fig. 6 is a longitudinal section of a part of the nozzle assembly shown in Fig. 3, taken along line 6—6 of Fig. 5;

Fig. 7 is a fragmentary side elevation showing the means for adjusting the nozzle slot opening as seen from line 7—7 of Fig. 5; and

Fig. 8 is an enlarged profile of one of the identically and specially shaped nozzle blades drawn to scale.

The present invention can best be explained by first considering the nature and arrangement of the principal components of a web coating machine as shown in Fig. 1. A web W of paper or the like that is to be coated, and coming from a supply that is not shown, enters the machine at the right and passes first over an idler roll 10 to a swing roll 12 that is adjustable to hold it in surface engagement with the upper portion of a color roll or coating applicator 14. The lower portion of the roll 14, which in this instance rotates in the direction of movement of the web W, is submerged in a color pan 16 containing a fluid coating composition introduced by means of a supply pipe 18 and discharged through a return pipe 20. After coating of the underside in the manner indicated, the web W proceeds to the bottom of a rotatably mounted backing roll or platen 22 arranged to expose the side of the web carrying the excess of liquid coating composition to the action of an air jet nozzle assembly indicated generally as 24. After impinging air from the nozzle 24 has removed the excess of coating from the surface of the web W to a predetermined extent, the web is drawn away at the upper side of the platen roll 22 by conventional means that are not shown. The after treatment of the coated web W may include passage over a suction box and thence to a dryer.

The air nozzle 24 includes a baffle in the form of plate 26 on the underside of the nozzle and supported thereby.

It will be noted that the discharge from the nozzle 24 is denoted "jet air" and that induced and passing between the lower side of the nozzle and the baffle 26 is identified as "secondary air," both flows of air merging and entering into an enclosing hood 28. The hood 28 is provided with a hinged cover 30 cooperating with the baffle 26 as shown, and a deflector plate 32 extending transversely of the machine for the width of the elongated nozzle 24, arranged below the platen roll 22 and angularly disposed to guide the air downwardly through the hood 28 as indicated by the flow lines with arrows, so that it may be discharged to the atmosphere at a distance or passed through a particle filter before discharge. A drip pan 34 is arranged below the plate 32 in a position to catch and collect the liquid portion of the coating composition removed by the nozzle 24 and not atomized or air borne. The deflector plate 32 keeps the combined air flow out of pan 34 and prevents deposit of coating particles on baffle 26 or web W. The drip pan 34 has a blowoff drain 36 at the bottom.

Referring to Figs. 2, 4, and 5, it will be seen that the air nozzle assembly 24 is pivotally supported in a spaced pair of upright members 38

and 40 supported by the frame of the coating machine.

The nozzle assembly 24 includes a cylindrical air pressure chamber or tubular manifold 44 having open ends as indicated in Fig. 6, and formed with a series of large, closely spaced circular discharge openings 46 along the entire bottom. The section of Fig. 5 best shows the manner in which the opposite lower side portions of the chamber 44 are flattened adjacent the bottom openings 46 in order to seat a pair of converging, nozzle throat and discharge slot defining plate members 50 and 52, held in face to face relation to the flattened areas by means of a plurality of countersunk screws 54, 54 extending from the outer faces of the plate members through the wall of the pressure chamber 44. It is to be especially noted that these screws offer no obstruction to air flow on the outer faces of the nozzle plate members 50, 52. The relatively large size and close spacing of the discharge openings 46 in the bottom of the chamber 44 insure a substantially uniform flow and discharge throughout the length of the nozzle assembly which completely spans the web passing over the platen roll 22.

While each of the nozzle forming plate members 50 and 52 has the same internal shape or profile, it will be seen that the upper member 50 is formed in two parts to provide an outer backing piece 55 of lesser width anchored at the base end portion by the screws 54, and threadedly receiving at its other end a countersunk screw 56. There are a plurality of these screws 56 spaced along the length of the plate member 50 and operable to adjust the slot opening formed by the lips 53 and 60 of the blade members, by deflecting at least one of the lip portions, namely the separate lip 53, toward the other, or permitting it to move away therefrom when spring tension is released by withdrawing motion of the screws 56. This form of adjustment requires no air seal and leaves both sides of the nozzle plate members 50 and 52 substantially unobstructed, and permits individual adjustment of the position of the lip 53 of the nozzle member 50 at closely spaced points along the entire length of the slot in close proximity to the slot opening. The backing piece 55 is received in a reduced outer formation of plate member 50 as a smooth continuation of its outer face.

The portions of the inside surfaces of the nozzle defining plate members 50 and 52 that are exposed to air pressure and flow have a particular curve or profile that is derived from experimental study. This profile curvature is illustrated most clearly in Fig. 8, which shows the lower plate member 52, it being understood that the upper plate member 50, which is in two parts, has essentially the same inner surface curvature. The actual dimensions of the blade member in inches are indicated on Fig. 8, which is drawn to scale. The unusually long nozzle curve is further defined by the two radii from which it is constructed as also shown in Fig. 8.

It has been found that this novel internal nozzle shape greatly reduces and in most instances substantially eliminates turbulence so that more uniform air flow and coating are obtained. The operating efficiency is greater due to elimination of turbulence losses, it being noted that much higher jet velocities are obtained for the same air pressure than with other nozzles used for this purpose. For comparison a commercially used flat slot nozzle and the improved nozzle of this

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invention have been operated at pressures of approximately 0.1 to 4 pounds per square inch, although the improved nozzle is intended to operate at 0 to 10 pounds per square inch.

The configuration of nozzle provided by plate members 50 and 52 has produced outstanding results. For a certain pressure and slot opening, and at a distance of one-half inch from the nozzle discharge opening the impact pressure is 1.1 inches of mercury as compared with 0.7 inch with the said commercially used flat slot nozzle. This is an increase of 57% in impact pressure. The comparative velocities (from the approximate formula $V=4005 \sqrt{P}$ F. P. M., P being the impact pressure in inches of water) are 15,500 feet per minute and 12,400 feet per minute, that is, 25% greater. For the same pressure and slot opening, at the nozzle itself there is still a 0.4 inch of mercury difference, but this corresponds to a 27% difference in impact pressure. Comparative velocities in this instance are 20,400 feet per minute as against 18,100 feet per minute, a 12% increase in velocity.

It will also be observed that the nozzle exterior is smooth and free of projections throughout the effective areas, with no adjusting screws on the lower plate member 52, which is adjacent baffle 26. The nozzle construction shown in the section of Fig. 5 is as small as possible for the interior shape employed and provides an included angle between exterior plate faces of less than 50 degrees. This promotes non-turbulent flow of secondary air over said faces and prevents buildup of coating particles on nozzle lips 58 and 60.

The following additional data, by way of illustration and not of limitation, will further explain the invention. The air jet nozzle opening formed by the lips 58 and 60 is of the order of 0.030 inch in width. Although the tubular manifold 44 is but 24 inches long, the length may be increased to ten feet or more. The nozzle throat angle, that is, between the inner faces of the plate members 50 and 52 is of the order of 43 degrees. The manifold in this embodiment has an inside diameter of $2\frac{3}{8}$ inches, and the width of the plate members which are secured to the outer flattened faces of the manifold is $5\frac{1}{8}$ inches. These dimensions will indicate the order of size of the other related parts of the nozzle assembly 24 and baffle plate 26.

It has also been found that both the exterior configuration of the nozzle assembly, and the shape and location of the baffle and other air flow control members are extremely important to the satisfactory operation of an air jet coater. The high velocity air impinging angularly on the surface of the web W at an acute angle to the tangent to the backing roll 22 at the point of impingement, as indicated in Fig. 1, atomizes part of the excess coating. Unless the atomized particles are carefully controlled, excess buildup on the baffle and the nozzle blades occurs, with resulting streaking and uneven coating of the web. While a baffle formed and arranged to direct the blowoff air and prevent the coating particles from depositing on the web as provided by the previously mentioned patent of Charles A. Dickhaut and Benjamin R. Newcomb achieves those purposes, the constriction thus produced permits buildup of atomized particles on the baffle itself by reason of circulating air currents in which the particles are suspended. It has been found that this buildup can grow very quickly and to the point where it contacts the surface of the web, causing streaks and seriously disturbing the ac-

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tion of the air jet. Moving the baffle away from the backing roll far enough to prevent serious buildup merely invites further trouble because the circulating air currents carry the atomized particles to the nozzle and produce a buildup there which diverts the air stream and again results in streaks of heavy coating.

The problems discussed in the preceding paragraph have been completely solved by the baffle 26 and deflector plate 32 formed and arranged as illustrated in Fig. 1 and as will be more fully explained subsequently.

The construction and arrangement of the means for pivotally mounting the baffle-carrying nozzle assembly 24 and for supplying air under pressure to the nozzle chamber 44 are shown in Figs. 2, 3 and 6. Referring to Fig. 6, each open end of the cylindrical air chamber 44 is secured in flush relation to a shouldered end plate 62 by a plurality of spaced screws 64, the inner surface of the chamber 44 being aligned with a bore 66 of the respective end plate. A sealing and connecting ring 68, preferably of brass, spans and fits over an outwardly extending shoulder or circular flange 70 on the end plate 62 and the adjacent similarly sized open end of a gooseneck air conduit 72 having its other end extending through and pivoted in the upright support member 38. As shown, the conduit 72 has oppositely turned angular ends. An upstanding elbow 74 has its lower end integrally secured as by welding to the outer face of the upright member 38 in alignment with the pivotally mounted end of the conduit 72. It will thus be seen that the nozzle assembly 24 can be rotated around the longitudinal axis of the air chamber cylinder 44 and also swung bodily about the parallel axis defined by the pivotal connection of the opposite goosenecks 72 and 72 in the supporting upright members 38 and 40. The common axis defined by the lower ends of the goosenecks 72, 72 lies substantially at the periphery of the roll 22 so that the angular relation of the nozzle assembly 24 to the roll may be adjusted without materially varying the spacing between the nozzle opening and the roll.

Each of the gooseneck conduits 72 is provided with an integral clamping plate 76 arranged to move over the adjacent inner surface of the respective upright members 38 and 40, and has an arcuate slot 77, as shown best in Fig. 2. Clamping screw assemblies 78 for holding the slotted plates 76, 76 in adjusted angular position have their screw portions extending through the respective slots 77 and are threadedly engaged in the corresponding upright member. Each of the upright members 38 and 40 is also formed with an arcuate slot 79 concentric with the corresponding slot 77 for receiving a clamping screw assembly 80 having its screw portion extending into and threadedly engaging the adjacent clamping plate 76, so that the respectively adjacent clamping plates 76 and upright members 38 and 39 are clamped to each other by the action of screw assemblies 78 and 80. Each clamping plate 76 is also formed with a radial lug 81 carrying an adjusting screw 82 engageable with a stop formation 83 on the corresponding upright member 38 or 40 to establish the angular position of the goosenecks 72 about their pivotal axis prior to clamping engagement of the plates 76 with said upright members.

Each end plate 62 of the cylindrical air pressure chamber 44 has an upward extension 84 on the side opposite the nozzle opening, these extensions being spanned by a counterweight in

the form of a handle or rod 85 mounted by means of connecting screws 86 at its respective ends. Each end plate 62 has an outwardly extending ear 88 carrying an adjustable set screw 90 arranged to abut the side of a stop block 92 extending radially from one of the sealing rings 68, each of these sealing rings being suitably fixed against rotation on its gooseneck 72.

The counterbalance 85 will maintain the nozzle assembly 24 in either the operative relation to the web W on the platen roll 22 shown in Fig. 4, or in an inoperative position away from the web, and against a spaced stop block 93, so that it can be adjusted, as shown by dotted lines in Fig. 4. The counter-balancing means or weight 85 for the pivotally mounted nozzle assembly 24 eliminates the problem of backlash in the nozzle position adjusting screws 90, which control the spacing of the nozzle slot from the platen roll 22, by applying pressure to these screws regardless of the direction in which they are turned.

It will be understood that the adjustment provided by the slotted clamping plates 76 and upright members 38, 39 permits swinging movement of the nozzle assembly 24 about the rotational axis defined by the outer angular ends of the rotating goosenecks 72, 72.

As indicated in Figs. 2, 3, 4 and 5, a plurality of mounting brackets 94 (only one of which is shown) support the baffle plate 26 on the under or lower side of the nozzle assembly 24 in the operative position shown in Fig. 5. This side of the nozzle plate member 52 is the one toward which the web W approaches. The baffle plate, 26 which extends at least the full width of the nozzle slot, makes an acute angle with the adjacent side of the nozzle 24 and includes a normally horizontal portion 96 terminating in a lip 98 of smooth downwardly bent section disposed beneath the nozzle lip portions 58 and 60. The horizontal portion 96 extends rearwardly to a back mounting part 100, extending downwardly as viewed in Fig. 5 and terminating in a rearward extension 102. This mounting of the baffle plate 26 on the nozzle assembly 24 is of great practical advantage in that the relative adjustment of nozzle opening and plate 26 is maintained at all times and baffle removal is unnecessary for any purpose.

Each mounting bracket 94 has a base 104 with parallel slots 106 receiving clamping screws 108 and a central upturned notch 110. An adjusting screw 112 turning loosely and restrained against axial movement in a lug 114, fitting between the legs of notch 110, is secured by spaced screws 116 to the upper edge of the nozzle plate member 52. A standard portion 118 of the bracket 94 is formed with forked portions 120 extending beyond its end and having slots 122 receiving clamping screws 124 threadedly engaging a mounting block 126. Screws 128 attach the mounting block 126 to the back part of baffle plate 26, as best shown in Fig. 5. An upstanding ear 130 on mounting block 126 fits between the forked portions 120 and carries an adjusting screw 132 turning loosely therein and restrained against axial movement. The baffle plate 26 is adjusted in a path parallel to the outer face of the nozzle plate member 52 by operation of the adjusting screw 112, the adjustment being maintained by tightening of the clamping screws 108. Adjustment of the baffle plate 26 in a direction perpendicular to the outer face of the nozzle plate member 52 is accomplished by operation of the adjusting screw 132. In this instance the selected adjustment is main-

tained when clamping screws 124 are tightened. It will thus be seen that the adjusting screw 112 produces positive adjustment of the bracket 94 in both directions parallel to nozzle plate member 52. Likewise the adjusting screw 132 acts positively in both directions in moving the baffle mounting block 126 perpendicularly to the plate member 32. The mounting brackets 94 and their associated adjusting means for providing horizontal and vertical adjustment of the baffle plate 26 are a sufficient distance from the critical areas near the nozzle lips 58 and 60 to insure against secondary air turbulence in those areas. By spacing the plurality of mounting brackets 94 at intervals across the nozzle assembly 24, the baffle plate 26 can be critically adjusted across the entire face of the nozzle.

The leading edge or lip 98 of the baffle plate 26 is relatively sharp so that particles cannot easily build up even if they should reach that area. A further advantage of the sharp baffle plate edge 98 is that the plate 26 can be moved forward of the leading edge portion of the nozzle without interfering with the jet air stream and without being sprayed by the direct blow-off, providing its vertical position is the same as the point of impingement of the air stream on the web. This relation is shown in Fig. 5.

Further control of the discharged air current is necessary because if the air and excess coating are permitted to blow directly into a drip pan such as 34, circulating currents are formed between the drip pan and the baffle 26, which deposit particles on the baffle despite the flushing action of the secondary air illustrated in Fig. 1. It has been determined that when a deflector plate such as 32 is inclined toward the platen roll 22 at an angle of about 45 degrees with the vertical, and the plate is spaced from six inches to ten inches from the nozzle slot, it will uniformly deflect the expanded air stream so as to eliminate turbulence and circulating air currents. Therefore, atomized coating particles cannot be deposited on the baffle plate 26 because they are always directed in a uniform stream away from the critical areas.

While a preferred embodiment of the invention has been illustrated and described in detail, it is to be understood that changes may be made in the details of construction and arrangement of parts without departing from the principles of the invention and the scope of the appended claims.

Having thus described our invention, what we claim as novel and desire to secure by Letters Patent of the United States is:

1. An air nozzle adapted for use in a web coating machine having a platen member over which a web carrying a coating of liquid composition is passed, said air nozzle having an elongated air jet discharge opening disposable in spaced parallel relation to the surface of the platen member and said nozzle being formed by a pair of converging plate members each terminating in a lip portion, one of said plate members being formed to provide a separate lip portion having the width of the plate member and a backing piece of less width, means securing together the inner edge parts of the separate lip portion and the backing piece, and means acting between the backing piece and the separate lip portion for adjustably deflecting the outer edge part of the separate lip portion to regulate the width of the discharge opening.

2. The combination of claim 1 in which said

separate lip portion has a reduced outer face formation receiving the backing piece.

3. An air nozzle adapted for use in a web coating machine having a platen member over which a web carrying a coating of liquid composition is passed, said air nozzle having an elongated air jet discharge opening disposable in spaced parallel relation to the surface of the platen member and said nozzle being formed by similarly shaped converging plate members each terminating in a lip portion, one of said plate members being formed to provide a separate lip portion having the width of the plate member and a backing piece of less width, means securing together the inner edge parts of the separate lip portion and the backing piece, and means disposed externally of the backing piece and acting therethrough for adjustably deflecting the outer edge part of the separate lip portion to regulate the width of the discharge opening.

4. An air nozzle adapted for use in a web coating machine having a platen member over which a web carrying a coating of liquid composition is passed, said air nozzle having an elongated air jet discharge opening disposable in spaced parallel relation to the surface of the platen member and said nozzle being formed by similarly shaped converging plate members each terminating in a lip portion, with the space included between the plate members being substantially unobstructed, one of said plate members being formed to provide a separate lip portion having the width of the plate member and a backing piece of less width, said separate lip portion having a reduced outer face formation receiving the backing piece, means securing together the inner edge parts of the separate lip portions and the backing piece, and a plurality of screw means threadedly received by the backing piece with their inner ends arranged to act on the outer edge part of only the outer face of the separate lip portion to regulate the width of the discharge opening by deflecting said separate lip portion.

5. An air nozzle adapted for use in a web coating machine having a rotatable supported backing roll over which a web carrying an excessive coating of liquid composition is passed, said air nozzle having an elongated air jet discharge opening disposable in spaced parallel relation to the peripheral surface of the roll and said nozzle being formed by similarly shaped converging plate members each terminating in a lip portion, with the space included between the plate members being substantially unobstructed, one of said plate members being formed to provide a separate lip portion having the full width of the plate member and a backing piece of less width, said separate lip portion having a reduced outer face formation receiving the backing piece as a smooth continuation of its outer face, means securing together the inner edge parts of the separate lip portion and the backing piece, and a plurality of adjusting screws threadedly received by and countersunk in the backing piece at closely spaced points along its length with their inner end arranged to act on the outer edge part of only the outer face of the separate lip portion selectively to regulate the width of the discharge opening along its length by deflecting said separate lip portion.

6. In a web coating machine having a web supporting member, an air nozzle including a spaced pair of plate members forming an elongated air jet discharge opening supported in spaced parallel relation to the surface of the web supporting member, and a baffle member supported

in spaced acute angle relation to the outer side of one plate member, said baffle member terminating in a forward edge portion beneath the nozzle discharge opening whereby the high velocity air stream from the nozzle blows across said forward edge portion, and said baffle member forms with said one plate member an outwardly converging discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

7. In a web coating machine having a platen member, an air nozzle formed with an elongated air jet discharge opening, means mounting the air nozzle for movement of the discharge opening toward and from the surface of the platen member, a baffle member mounted on the air nozzle in spaced relation to one side thereof, said baffle member forming with the air nozzle a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening, and means interposed between the nozzle and the baffle member for moving said baffle member relative to said nozzle.

8. In a web coating machine having a web supporting member, an air nozzle formed with an elongated air jet discharge opening, means mounting the air nozzle for rotation about an axis parallel to the web supporting member toward and from the surface of the web supporting member, and a baffle member mounted on the air nozzle in spaced acute angle relation along one side thereof, said baffle member forming with the air nozzle a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

9. In a web coating machine having a platen member over which a web is passed, an air nozzle formed with an elongated air jet discharge opening, means mounting the air nozzle for movement of the discharge opening toward and from the surface of the platen member, and a baffle member mounted on the air nozzle in spaced acute angle relation to the side toward which the web approaches, said baffle member forming with the air nozzle a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

10. In a web coating machine having a backing roll over which a web is passed, an air nozzle formed with an elongated air jet discharge opening, means mounting the air nozzle for rotation about an axis parallel to the backing roll, and a baffle plate mounted on the air nozzle in spaced acute angle relation to the side toward which the web approaches, said baffle plate forming with the air nozzle a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

11. In a web coating machine having a rotatable supported backing roll, an air nozzle including a spaced pair of plate members forming an elongated air jet discharge opening, means mounting the air nozzle for movement of the discharge opening toward and from the backing roll to adjust the spaced relation of the discharge opening to the surface thereof, and an external baffle plate mounted on the air nozzle in spaced relation to the outer side of the plate member that is lowermost when the air nozzle is in operative relation to the backing roll, said baffle plate forming with the outer side of the adjacent plate member a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

12. The combination of claim 11 in which the

external baffle plate is in acute angle relation to said plate member that is lowermost and terminates in a smooth downwardly bent lip below the air jet discharge opening, whereby the high velocity air stream from the nozzle blows across said bent lip.

13. In a web coating machine having a rotatably supported backing roll, an air nozzle including a spaced pair of plate members forming an elongated air jet discharge opening, means mounting the air nozzle for rotation about an axis parallel to the backing roll to adjust the spaced relation of the discharge opening to the surface thereof, and an external baffle plate carried in spaced acute angle relation by the plate member that is lowermost when the air nozzle is in operative relation to the backing roll, said baffle plate terminating in a sharp forward edge portion forming with the outside of the adjacent plate member a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

14. In a web coating machine having a rotatably supported backing roll, an air nozzle including a spaced pair of plate members forming an elongated air jet discharge opening, means mounting the air nozzle for rotation about an axis parallel to the backing roll to adjust the spaced relation of the discharge opening to the surface thereof, an external baffle plate carried by the plate member that is lowermost when the air nozzle is in operative relation to the backing roll, said baffle plate terminating in a sharp forward edge portion forming with the outside of the adjacent plate member a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening, and adjusting means interposed between the rearward portion of the baffle plate and said lowermost plate member for advancing or retracting the forward edge portion of the baffle plate relative to the opening of said nozzle discharge opening.

15. In a web coating machine having a rotatably supported horizontal backing roll, an air nozzle including a spaced pair of plate members forming an elongated air jet discharge opening, means mounting the air nozzle for rotation about an axis parallel to the backing roll to adjust the spaced relation of the discharge opening to the surface thereof, an external baffle plate disposed in spaced relation to the plate member that is lowermost when the air nozzle is in operative relation to the backing roll, said baffle plate terminating in a sharp forward edge portion forming with the outside of the adjacent plate member a converging discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening, and a supporting bracket extending between the rearward portion of the baffle plate and the adjacent plate member, said supporting bracket including an adjusting means for moving the baffle plate in a direction parallel to said adjacent plate member, and another adjusting means for moving the baffle plate perpendicular thereto.

16. In a web coating machine having a horizontal backing roll, an air nozzle formed with an elongated air jet discharge opening, means mounting the air nozzle for rotation about an axis parallel to the backing roll toward and from operative relation to the backing roll, a baffle plate mounted on the air nozzle in spaced relation to the side thereof that is lowermost when the air nozzle is in said operative relation,

said baffle plate forming with the air nozzle a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening, abutment means in the path of rotation of the air nozzle arranged to stop the air nozzle in said operative relation, and counterbalancing means connected with the air nozzle and arranged to maintain said air nozzle in said operative relation.

17. In a web coating machine having a horizontal backing roll, an air nozzle formed with an elongated air jet discharge opening, means mounting the air nozzle for bodily swinging movement about an axis parallel to the backing roll for changing the angular relation of the nozzle to the surface thereof, means rotatably supporting the air nozzle on said mounting means for axial rotation toward and from operative relation to the backing roll, a baffle plate mounted on the air nozzle in spaced relation to the side thereof that is lowermost when the air nozzle is in said operative relation, said baffle plate forming with the air nozzle a discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening, spaced abutment means in the path of rotation of the air nozzle arranged to stop the air nozzle in operative relation to the backing roll and in a different position away from the backing roll, and counterbalancing means on the air nozzle and arranged alternatively to maintain said air nozzle in said operative relation, and to hold said air nozzle in said different position.

18. In a web coating machine, the combination comprising a rotatably mounted horizontal backing roll, an air nozzle formed with an elongated air jet discharge opening extending in closely spaced parallel relation to one side of said roll for directing a jet of air onto said roll at an oblique downward angle to a tangent thereto at the point of impingement, a baffle plate mounted beneath the nozzle in angular relation to said tangent and having a lip portion extending in closely spaced parallel relation to said discharge opening and the surface of the roll, the adjacent portions of the nozzle and baffle plate converging toward the roll to form a space into which a flow of air is induced by said jet of air, a drip pan disposed beneath the backing roll to catch coating material removed by said jet of air, and a deflector member above the drip pan arranged angularly to intercept the jet air after impingement and divert it in a direction away from the drip pan and the backing roll.

19. In a web coating machine, the combination comprising a rotatably mounted horizontal backing roll, an air nozzle formed with an elongated air jet discharge opening extending in closely spaced parallel relation to one side of said roll for directing a jet of air onto said roll at an oblique downward angle to a tangent thereto at the point of impingement, a baffle plate mounted beneath the nozzle in perpendicular relation to said tangent and having a lip portion extending in closely spaced parallel relation to said discharge opening and the surface of the roll, the adjacent portions of the nozzle and baffle plate converging toward the roll to form a space into which a flow of air is induced by said jet of air, a drip pan disposed beneath the backing roll to catch coating material removed by said jet of air, and a deflector plate between the drip pan and the backing roll arranged at an acute angle to the horizontal to intercept the jet air after impingement

and divert it out of the drip pan and in a direction away from the backing roll.

20. In a web coating machine having a rotatably supported horizontal backing roll, an air nozzle including a spaced pair of plate members forming an elongated air jet discharge opening, means mounting the air nozzle in parallel relation to the backing roll for directing a jet of air onto said roll at an oblique downward angle to a tangent thereto at the point of impingement, and a baffle plate supported in spaced, acute angle relation to the outer side of the plate member that is lowermost when the air nozzle is thus mounted and directed, said baffle plate terminating in a forward edge portion forming with the outer side of said lowermost plate member a converging discharge slot for a flow of secondary air induced by high velocity air from the air nozzle discharge opening.

21. In a web coating machine having a rotatably mounted backing roll over which a web carrying a coating of liquid composition is passed, an elongated air nozzle formed with an elongated air jet discharge opening and circular flange end portion, a pair of spaced upright supporting members forming a part of the machine, a conduit having oppositely turned angular ends mounted by one end on each supporting member for rotation about a common axis lying adjacent the periphery of said roll, a bearing sleeve integrally joined with and projecting from the other end of each conduit, said air nozzle having its opposite end portions projecting in and rotatably

supported by the respective projecting portions of each bearing sleeve.

22. In a web coating machine having a rotatably mounted backing roll over which a web carrying a coating of liquid composition is passed, an elongated nozzle formed with an elongated air jet discharge opening and circular flange end portion, an opposed pair of spaced upright supporting members forming a part of the machine, a gooseneck conduit mounted by one end for rotation on an inner side of each supporting member about a common axis lying adjacent the periphery of said roll, a bearing sleeve secured to and projecting from the other end of each gooseneck conduit, said air nozzle having its opposite end portions projecting in and rotatably supported by the respective projecting portions of each bearing sleeve, a stop abutment extending from and beyond the periphery of one bearing sleeve, and an abutment engaging means extending from the adjacent end of the air nozzle to limit rotation of said nozzle.

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