

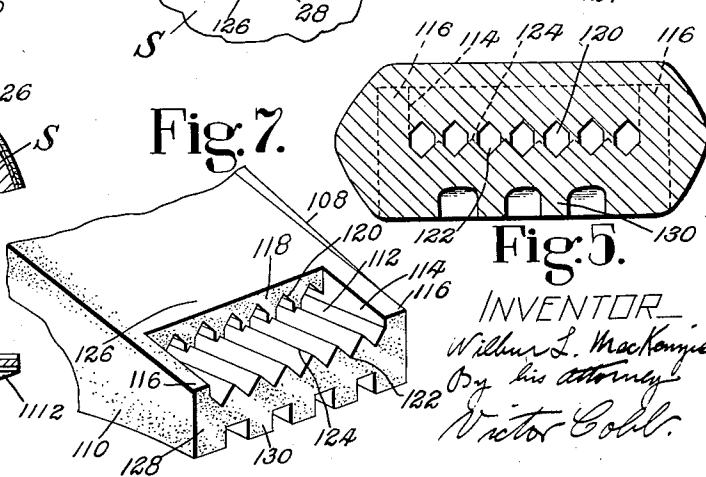
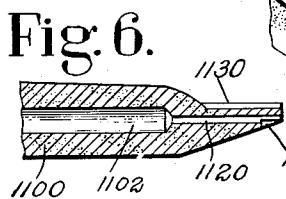
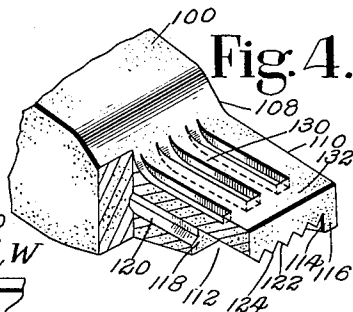
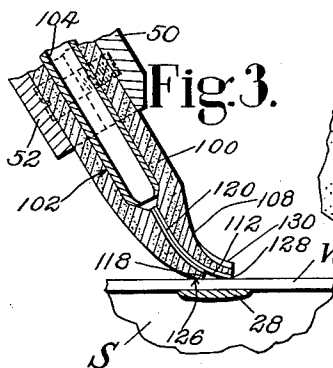
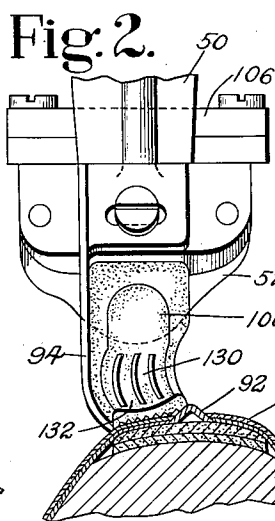
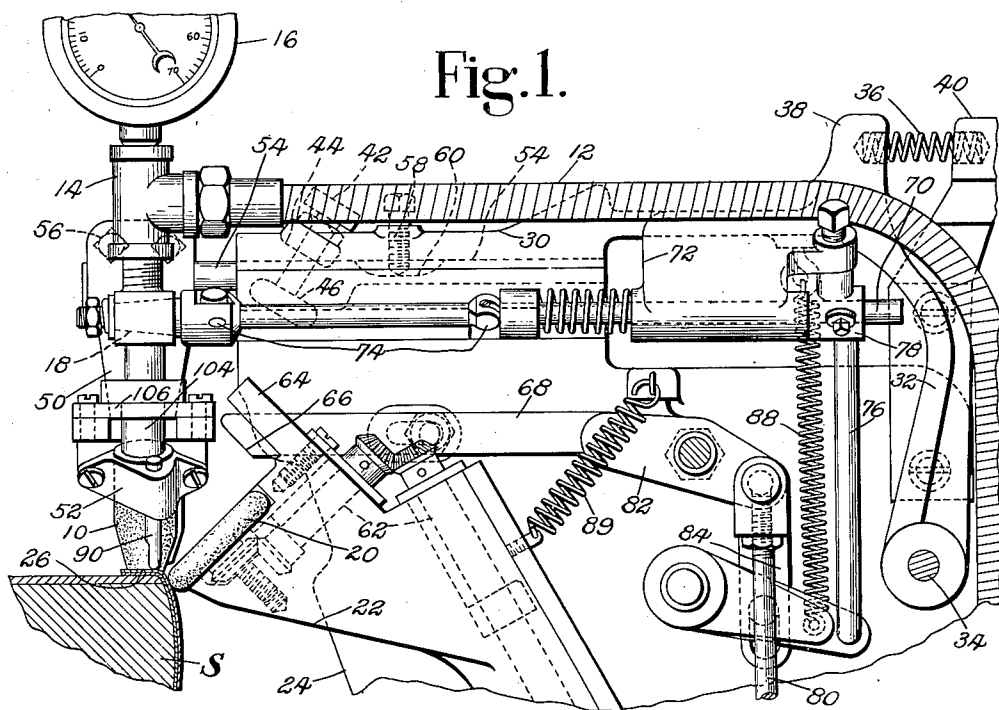
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2,100,342

NOZZLE FOR EXTRUDING MACHINES

Original Filed Nov. 24, 1934



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UNITED STATES PATENT OFFICE

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NOZZLE FOR EXTRUDING MACHINES

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No. 754,648. Divided and this application July
11, 1936, Serial No. 90,168

23 Claims. (Cl. 91-43)

This invention relates to coating-applying machines, being principally concerned with nozzles for machines of the extruding type. It is herein illustrated as embodied in a machine particularly adapted for applying a coating to the bottom of a shoe prior to the application of a sole thereto and claimed in an application for Letters Patent of the United States Serial No. 754,648, filed November 24, 1934 in my name and of which this is a division.

In the manufacture of compo shoes, the sole of the shoe is secured to the overlapped upper and, it may be, to other portions of the shoe principally by an interposed coating of adhesive which, for ease of discussion, will hereinafter be termed cement. Commonly, this cement is of the pyroxilin type, is quite viscous and tends to be quick drying, and a marginal stripe is applied to the bottom of the shoe. In many shoes, this stripe will lie upon the overlapped margin of the upper. If the compo shoes are of the welt type, then the cement will be applied to the outwardly extending welt and to the adjacent insole or between substance. The problem of applying a coating to the particular surfaces in question is rendered extremely difficult by the nature of those surfaces. In compo shoes which have no welt, the margin of the overlapped upper is rarely flat and in many portions is wrinkled and creased. Furthermore, the profile of the bottom surface of a shoe is not regular and the relation of the bottom surface to other parts of the shoe varies markedly according to the style of the shoe and the shape of the last. If the application of cement is to the welt and insole, as in compo welts, then the flesh surface of the welt is rough, the insole has many crevices and may not have been trimmed evenly, and the welt is flexible and frequently curves heightwise out of the plane of the adjacent bottom of the shoe.

An object of the present invention is to provide, for use in a coating-applying machine of the extruding type, an improved nozzle by means of which coating material may be applied continuously and uniformly and may be located in the desired position upon the work.

In the illustrated machine, the nozzle is supported for heightwise yielding movement and is inclined downwardly and forwardly so that the outlet end of the nozzle extends in the general direction of forward movement of the work and rides on the work. A feature of the invention resides in the provision, at the outlet end of a flexible nozzle, of an open-ended recess into which the cement is delivered through minute passages

leading from the hollow body portion of the nozzle. With this construction, the work presented to the nozzle does not come in contact with the open ends of the delivery passages. Conveniently, one side of the recess is also open but is closed by the contacting work thereby forming a chamber open at the leaving end. This chamber becomes filled with coating material which is, therefore, disposed upon the work in adequate quantities in a band, the sides of which are determined by lateral flanges forming the sides of the recess.

Preferably and as illustrated, the nozzle has a resilient tip portion in which this open-ended recess is formed and, being capable of yielding and twisting, may be kept in firm contact with the irregular, uneven surface to be coated, avoiding the danger of a lateral spreading of the coating material and assisting in leaving a deposit on the work which is of a uniform thickness.

These and other features of the invention are set forth in the following description, taken in connection with the accompanying drawing, in which

Fig. 1 is a side elevation of a portion of a machine in which my improved nozzle has been embodied for the sake of illustration;

Fig. 2 shows, on a larger scale, the nozzle viewed in the opposite direction from Fig. 1, together with a portion of its holder;

Fig. 3 is a fragmentary view showing a vertical section taken substantially axially of the nozzle and showing the deflection of the tip of the nozzle as the work is brought into contact with it;

Fig. 4 is an enlarged angular view of the tip of a nozzle designed particularly for the bottoms of shoes which have no welts;

Fig. 5 is an enlarged section through the end of a nozzle such as is shown in Fig. 4 but in inverted position and on a much larger scale;

Fig. 6 is a longitudinal section with a modified nozzle, and

Fig. 7 is an enlarged angular view of the tip of the nozzle shown with the recess facing up.

In general, the machine comprises a nozzle through which a coating material, such as cement, is supplied under pressure. The cement is fed to the nozzle through a flexible hose 12 leading to pipe fittings 14 to which is fastened a pressure gage 16 and which embody a turn valve. Associated with the nozzle is a rubber-tired feed wheel 20 which is movably mounted on a carrier 22 supported in a hollow frame 24, only one side of which is shown in Fig. 1. The arrangement is such that an operator holding a shoe S in in-

verted, substantially horizontal position presents that portion of the bottom of the shoe adjacent to the heel-breast line to the nozzle 10, and by depressing a suitable treadle (not shown) moves the feed wheel 20 into the position shown in Fig. 1 where the wheel is in contact with the side of the shoe, and also opens the valve 18 to allow a flow of cement through the nozzle. The rotation of the driven feed wheel 20 causes a progressive movement of the shoe which is guided by the operator to present to the nozzle the margin of the bottom of the shoe around the toe end thereof back to a corresponding point on the other side of the shoe with the result that there is applied a marginal band of cement to the overlapped upper 26. The machine may also be used for shoes having a welt W, as shown in Fig. 3, and, when thus employed, the machine will include a welt-supporting member 28.

Mounted in the frame 24 is a nozzle-supporting lever 30 having a depending rear end 32 carried on a cross pivot 34. Upward tilting movement of the nozzle-supporting lever 30 is opposed by a spring 36 interposed between a lug 38 on the lever and a fixed lug 40 on the frame. The normal lowermost position of the lever is determined by means of a screw 42 threaded in a flange 44 on the lever and contacting with a flange 46 on the side of the frame.

The nozzle 10 is held on the lower end of an arm 50 by means of a clamp plate 52 and this arm is held in the desired angular position on a supporting rod 54 attached to the lever 30 by means of pinch screws 56 passing through a split portion of the arm. The rod 54 is mounted for axial adjustment in the outer end of the lever 30, being guided by the pointed end of a set screw 58 which cooperates with a V-shaped groove 60 in the rod and which, when screwed down, serves to clamp the rod against both axial and turning movement.

The feed roll 20 mounted in the pivoted carrier 22 is driven by means of interconnected shafts 62 and is moved outwardly by the operator until an arm 64 on the carrier 22 engages the intumed end 66 of an adjustably mounted stop bar 68. Opening and closing of the valve 18 is effected by actuation of a valve rod 70 journaled in a bracket 72 which is a part of the carrier lever 30. This valve rod 70 is connected to the valve 18 through universal joints 74 so that the actuation of the valve is not affected by adjustments of the position of the nozzle-carrying arm 50. Turning movement of the valve rod 70 is secured by pulling a rod 76 attached to a lever 78 which is secured to the valve rod. It is desired that the feed roll shall be moved out into position before the valve is opened and vice versa, and this is accomplished in the illustrated machine by a treadle (not shown) connected to a treadle rod 80. The rod 80 is secured at its upper end to a pivoted stop lever 82 joined to a link 84 which has a lost-motion connection to a lever 86 joined to the lower end of the valve-operating rod 76. A spring 88 is provided to close the valve and a spring 89 is arranged to draw the feed-roll carrier 22 into the hollow frame of the machine when the treadle attached to the treadle rod 80 is no longer depressed.

It will be understood that a nozzle of this type is subjected to repeated distortions as successive shoes are presented to the nozzle, and during the traversing movement of a single shoe, it is flexed up and down and sidewise because of the uneven character of the bottom of a shoe, in which the

shank portion is not in the same plane as the forepart and is connected to the forepart by a portion of double curvature adjacent to the ball line. In order that the nozzle may not be unduly distorted, and to facilitate its movement over the work and retention in the desired position on the work, there may be associated with the nozzle a skid finger 90, best shown in Fig. 1, which takes from the nozzle the shock of riding over heightwise irregularities and also limits the upward pressure which the operator may apply to the nozzle. At the shank portions of shoes, such as the shank portion of the shoe S illustrated in transverse cross section in Fig. 2, the overlapped upper 26 is close to a metal shank member 92 which may, as shown, be ridged. When the nozzle passes over such a portion of the shoe, it is twisted and distorted, as indicated somewhat in Fig. 2, and, in order that it may not be laterally deflected beyond the outer margin of the area which is to be coated, there may be associated with the nozzle a side finger 94.

The successful operation of the machine depends to a considerable degree on the construction of the nozzle 10. The work to be coated is of irregular contour both laterally and heightwise of the shoe and provides a relatively rough surface to which cement may be applied uniformly only with considerable difficulty. For such work, the improved construction herein shown and described provides a nozzle which may be made of relatively flexible material, such as soft rubber, and by means of which a controllable quantity of cement may be applied with great regularity and in a uniform manner. This nozzle comprises a hollow body portion 100 (Fig. 3) having a large passage 102 which receives a tubular extension, 104 extending downwardly from the bottom of a plate 106 (Fig. 1) and at an acute angle thereto. The flattened end of the nozzle is reduced in thickness as at 108 (Fig. 3) and slightly in width (Figs. 1 and 2) so that it may be flexed from a position in which it lies substantially symmetrical with respect to the center plane of the body 100 to a position, such as is shown in Figs. 2 and 3, in which the tip 110 is bent at a decided angle to the body 100. This tip 110 is provided with a substantially U-shaped, open-sided, open-ended recess 112 defined laterally by the inner faces 114 (Figs. 4 and 7) of side flanges 116 and by an inner, end surface 118 (Fig. 4). The open side of the recess is positioned adjacent to the work and as the work travels with respect to the nozzle, the direction of feeding movement is away from the open end of the recess so that the recess is open at the forward end of the nozzle tip, thereby permitting the deposition of a band of cement. Depending on the quantity of cement extruded, as determined by the pressure applied, this will leave parallel stripes or a single band of cement of uniform character, the width of which will be determined by the space between the side flanges 116. Minute passages 120 lead from the interior of the body portion to the inner corner of this recess. These passages are preferably of such a size that they are capillary and, therefore, function like the capillary tubes employed in the nozzle shown in an application for Letters Patent of the United States No. 2,058,461, granted October 27, 1936, on the application of Joseph W. Johnson, for improvements in Nozzles for machines for preparing soles for cement shoes. Conveniently, the nozzle is constructed by molding and when this is done, a core (not shown)

which forms the large passage 102 may carry a series of six-sided rods (not shown) having a cross-sectional shape like that of the passages 120, shown much enlarged in Fig. 5. Conveniently, too, these rods are extended to the extreme end of the nozzle and two sides of each rod are utilized to form V-shaped grooves 122 separated by V-shaped ribs 124. In the use of the nozzle, these ribs 124 rest on the work, as indicated in Figs. 2 and 3, and prevent the open end of the recess 112 from being closed by the pressure of the work against the nozzle. The tip of the nozzle serves also as a wiper or spreader by which the applied coating is rubbed into the work and evenly distributed in the direction of the length of the applied band. Preferably, the spacing of the V-shaped ribs is such that the grooves formed therebetween will be completely filled with cement at the particular pressure applied, thus insuring a good contact of the cement with the work without too much pressure by the nozzle on the work. It has been found that too wide a spacing of these ribs tends to produce stripes of cement on the work, which stripes, though they may be very slightly separated when originally applied, are of sufficient body so that they tend to shrink away from each other and to leave markedly separated stripes, a condition which is not usually desirable. A spacing between the ribs of one-sixteenth to one-twentieth of an inch has been found to be suitable. The nozzle rests on the work at a point on the nozzle which, for convenience, will be termed the heel 126 (Figs. 3 and 7) of the nozzle and at its extreme tip 128. There is, accordingly, opportunity for the cement to completely surround the ribs 124 at the inner part of the recess 112 and thus to lubricate these ribs to such an extent that wear on them is greatly reduced.

To secure adequate contact between the tip of the nozzle and the work, the tip 110 is provided on its upper face with a series of parallel reinforcing ribs 130 (Figs. 2 and 4). When the nozzle is to be used for welt cementing, as in Fig. 3, these ribs extend as such all the way to the end of the nozzle. It is sometimes found desirable for this kind of work also to reduce the depth of the end portions of the side flanges 116 and, if it is desired to have a band of cement of uniform thickness, also to chamfer the end portions of the ribs 124. This construction is shown in Fig. 6, where similar parts are indicated by similar numerals to which 1000 has been added. On the other hand, if the nozzle is to be used for shoe bottoms of compo shoes S of the type illustrated in Figs. 1 and 2, then it is found desirable to interconnect the ribs 130 by means of a transverse rib 132 (see also Fig. 4) formed integrally with the tip of the nozzle to prevent undue distortion and to keep the V ribs 124 near the center of the outlet end of the recess from being pressed so firmly against the work as to divide the resulting band of cement into spaced parallel stripes, for example.

The spreader action of the tip of the nozzle has been found to be of considerable advantage in the elimination of bubbles in certain types of work. The reason for these bubbles is not fully understood. They may result from the fact that in very rough work the coating of cement bridges a small pocket containing air. This air may then interact with the material of the cement to form a greater quantity of gas which expands the layer of cement and makes a protruding bubble. Such bubbles either harden as protrud-

ing lumps or else burst and form distinct crater rims which protrude from the work and are a hindrance in securing perfect adhesion between the shoe parts. Whatever the explanation may be, they are definitely eliminated by the spreading or wiping action of the tip of the nozzle as the V ribs 124 therein are dragged through the applied coating. Many manufacturers desire that the coating shall be of full thickness at the outer edge of the work so that there shall be no doubt that perfect adhesion is secured at this point. If the sole adheres to the shoe along the outer margin of the applied band of cement, then a satisfactory job results. If there is any tendency to imperfect adhesion at this point, then it does not make much difference how much cement may have been applied to the inner edge of the margin because the sole will break away from the shoe at the outer edge. The machine herein illustrated is of decided utility because of its inherent action in applying a band of cement to the margin of a shoe which will be of full thickness at the outer edge without being so thick as to cause "squeeze-out" and the consequent danger of soiling the upper. The nozzle construction appeals to operators as no time is required for cleaning the machine when it is left for the night. It is simply necessary to smear a quantity of cement over the recessed end of the nozzle and to allow it to harden thereon, preventing any cement in the passages of the nozzle from drying out. When the machine is again desired for use, the operator needs only to distort the tip of the nozzle, breaking away the hardened cement and leaving the nozzle in condition for immediate use.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A nozzle past which a piece of work may be moved and comprising a hollow body portion and a resilient tip portion having a lateral recess open at the side and at the leaving end of the tip portion, and passages opening in the inside of said hollow body portion and extending along said tip portion, the end portions of said passages opening laterally of said tip in said recess.

2. A nozzle in contact with the side face of the tip of which a piece of work may be moved and comprising a hollow body portion, a tip portion of conformable material provided with a lateral recess having that side which is adjacent to the work open, said recess being also open at the leaving end, and passages interconnecting the hollow body portion and said recess.

3. A nozzle having a flattened flexible tip portion provided with an outlet opening in a side face of said tip portion and adapted to be deflected by pressure against a piece of work, and means acting directly on said flexible tip portion to resist excess flexure thereof by a piece of work with which the nozzle may be in contact.

4. A nozzle having a flattened flexible tip portion provided with an outlet opening and adapted to be deflected by pressure against a piece of work, and means arranged to act directly on said flexible tip portion to resist excess deflection as the work reacts with the tip portion, said tip portion having parallel ribs extending along the work-contacting face of said tip.

5. In an extruding machine, a nozzle of flexible material comprising a hollow body portion and a flattened tip portion of reduced thickness having an outlet opening in one side thereof, minute passages interconnecting the inside of the body

portion with the outlet opening, and resilient means acting directly on the tip portion to resist excess deflection by a piece of work presented to said tip portion adjacent to said outlet opening and hence to hold the tip portion against the work.

6. In an extruding machine, a nozzle having a hollow body portion and provided with a resilient tip having an outlet opening, said nozzle also having a passage connecting the inside of said body portion with said outlet opening, and resilient ribs on the side of said tip away from its work-engaging face to assist in holding the tip in firm contact with the work while permitting deflection of the tip.

7. In an extruding machine, a nozzle of flexible material past which a piece of work may be moved and comprising a hollow body portion and a work-contacting tip portion, and resilient means acting directly on said tip portion for resisting the pressure of the work, the work-contacting surface of said tip portion being provided with a recess open at its leaving end, there being minute passages connecting the inside of said body portion with said recess.

8. A nozzle constructed of resilient material comprising a hollow body portion and a flattened tip portion of reduced thickness having a recess bounded by lateral ribs, said nozzle being provided with passages extending from said body portion and emerging in a broad side of said tip portion within said recess.

9. A nozzle constructed of resilient material comprising a hollow body portion and a tip portion of reduced thickness, said nozzle being provided with passages extending from said body portion and emerging at one side of said tip portion and with ribs along the tip near the point where the passages emerge.

10. A nozzle constructed of resilient material comprising a hollow body portion and a tip portion of reduced thickness, said nozzle being provided with passages extending from said body portion and emerging at one side of said tip portion and with ribs along the side of the tip portion opposite to that from which the passages emerge.

11. A nozzle constructed of resilient material comprising a hollow body portion and a tip portion of reduced thickness, said nozzle being provided with passages extending from said body portion and emerging at one side of said tip portion and with ribs along the side of the tip portion opposite to that from which the passages emerge, said ribs being interconnected by a rib extending transversely thereto.

12. A nozzle constructed of resilient material and comprising a hollow body portion and a tip portion of reduced thickness, said nozzle being provided with passages extending from said body portion and emerging at one side of said tip portion, the work-engaging side of the tip portion being provided with grooves in line with said passages.

13. In an extruding machine, a nozzle adapted to rest on the work and having a minute passage, said nozzle having at its work-contacting side a recess an open side of which faces the work, said recess having also an open leaving end, the outlet end of said passage being positioned at the inner corner of said recess.

14. In an extruding machine, a nozzle having a minute passage, said nozzle having at its work-contacting side an open-ended recess, the outlet end of said passage being positioned at the inner

corner of said recess, and spaced ribs extending along a face of said recess thereby to provide a groove between the ribs communicating with the outlet end of the passage and extending in the direction of relative movement between the nozzle and the work.

15. In an extruding machine, a nozzle having a hollow body portion and a resilient tip, the work-contacting side of said tip being provided with a recess bounded by lateral flanges and a heel, all of which are adapted to rest against the work to prevent extrusion of the cement laterally or toward the rear, the top surface of the recess between said flanges being provided with ribs which at the inner end of the recess are of less height than the portion of the lateral flange opposite thereto, said ribs being adapted to contact with the work at the leaving end of the nozzle after having been lubricated by the cement covering the ribs at the rear of the recess, there being passages interconnecting the hollow body portion with said recess.

16. In an extruding machine, a nozzle having a hollow body portion and a resilient tip, the work-contacting side of said tip being provided with a recess bounded by lateral flanges, and ribs of less depth than the flanges disposed along the top of the recess between said flanges thereby to form a series of grooves extending in the direction of relative movement between the nozzle and the work, said nozzle having passages interconnecting the inside of said body portion with said recess.

17. In an extruding machine, a nozzle having a hollow body portion and provided with a resilient tip having an outlet opening, and resilient ribs on the upper side of said tip permitting deflection of the tip while holding it in firm contact with the work, said ribs being interconnected by a transverse rib adjacent to the trailing end of the ribs.

18. A nozzle adapted to rest on the work and having a passage terminating in an outlet opening and comprising a flexible spreader adapted to rest on the work forwardly of the nozzle, said nozzle having a heel portion adapted for contact with the work to the rear of the spreader and constructed and arranged to hold the outlet opening away from the work, the nozzle also having two sides to limit lateral spread of the extruded material.

19. A nozzle having a tip portion adapted to rest on the work and having a passage terminating in an outlet opening spaced inwardly from the work-contacting surface of the nozzle, said nozzle also comprising a flexible spreader adapted to rest on the coated portion of the work and provided with a surface having a plurality of parallel ribs which are effective in preventing the spreader from wiping coating material from the surface of the work.

20. In an extruding machine, a nozzle having a heel for contact with the work as relative movement is produced between the nozzle and the work to apply a band of coating material, said nozzle having a passage terminating in an outlet opening which is spaced from the heel thereby to avoid closing of the outlet opening by pressure of work against the nozzle and comprising a flexible spreader constructed and arranged to be deflected by a piece of work presented to the nozzle and provided with ribs extending lengthwise thereof to rest on the surface of the work at the forward side of the nozzle.

21. In an extruding machine, a depending nozzle

5 zle having a heel for contact with the work as
relative movement is produced between the nozzle
and the work to apply a stripe of coating material,
said nozzle having a passage terminating in an outlet
opening which is at a level above the level of the heel
thereby to avoid closing of the outlet opening by
pressure of work against the nozzle and comprising a
flexible spreader associated with the nozzle and constructed
and arranged to be deflected by a piece of work presented
to the nozzle and to rest on the surface of the work at
the forward side of the nozzle, said spreader being provided
with a grooved surface to prevent the spreader from wiping
coating material from the surface of the work.

10 22. In an extruding machine, a depending nozzle
having a heel for contact with the work as relative
movement is produced between the nozzle and the work
to apply a band of coating material, said nozzle having
a passage terminating in an outlet opening which is at a
level above the level of the heel thereby to avoid closing
of the outlet opening by pressure of work against the
nozzle, and comprising a resilient spreader associated
with the nozzle constructed and arranged to be deflected
by a piece of work presented to

the nozzle and to rest on the surface of the work at
the forward side of the nozzle, said spreader having a
grooved portion the lateral edges of which bear on the
work thereby to determine the lateral extent of the band
of coating material which is deposited on the work.

23. In an extruding machine, a depending nozzle
having a heel for contact with the work as relative
movement is produced between the nozzle and the work
to apply a band of coating material, said nozzle having
a passage terminating in an outlet opening which is at a
level above the level of the heel thereby to avoid closing
of the outlet opening by pressure of work against the
nozzle, and comprising a resilient spreader constructed
and arranged to be deflected by a piece of work presented
to the nozzle and to rest on the surface of the work at
the forward side of the nozzle, said spreader having a
grooved portion the lateral edges of which bear on the
work thereby to determine the lateral extent of the band
of coating material which is deposited on the work, said
grooved portion being provided with ribs extending in the
direction of relative movement.

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