May 6, 1958 G. G. NEIDICH ET AL 2,833,242

NOZZLE FOR STRIPING WEB MATERIALS

Filed Oct. 18, 1954 2 Sheets-Sheet 1

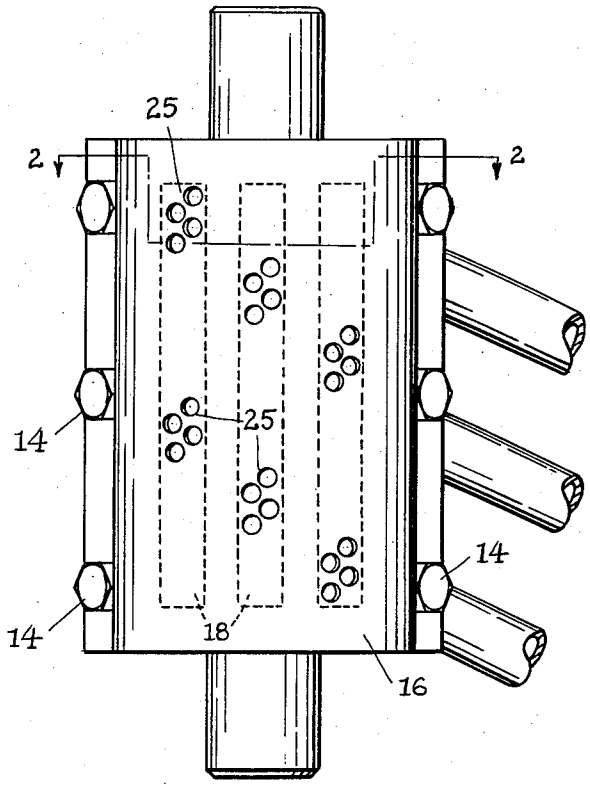


FIG-1

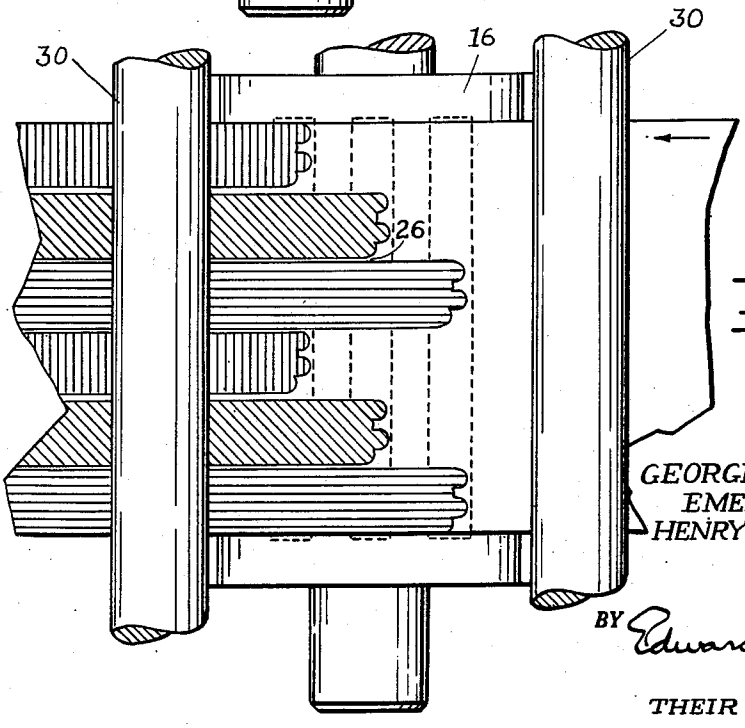


FIG-5

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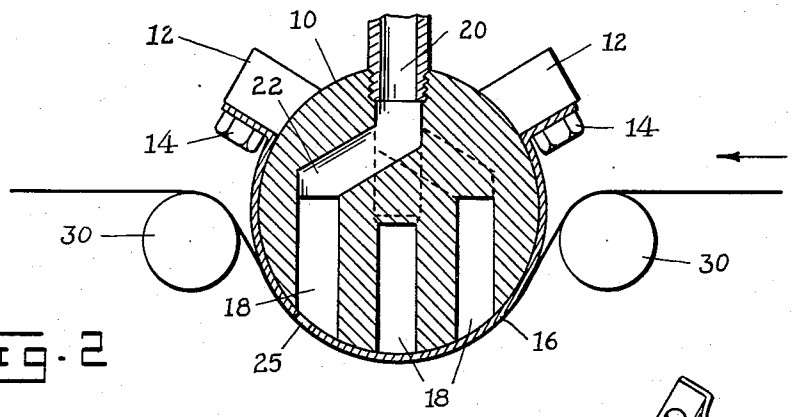


Fig. 2

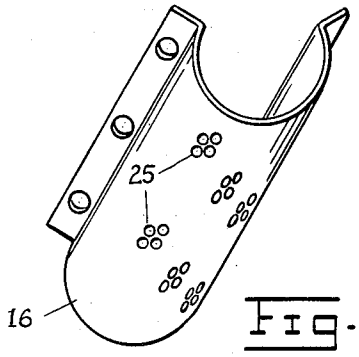
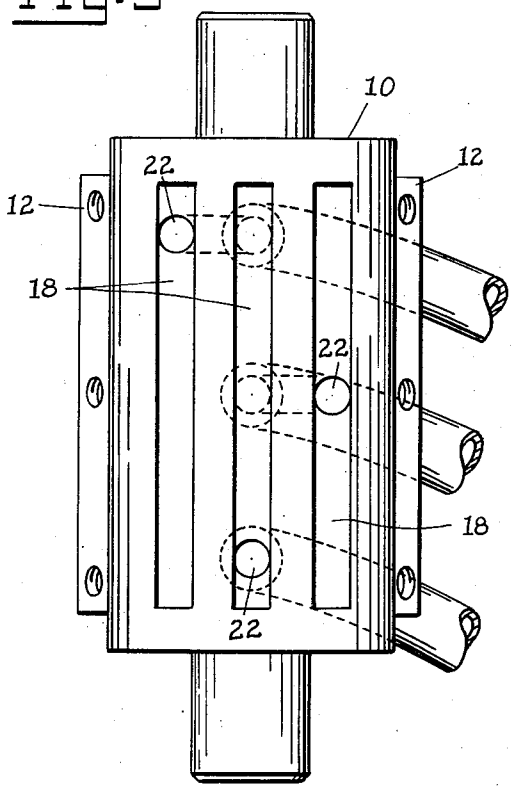


Fig. 4

Fig. 3



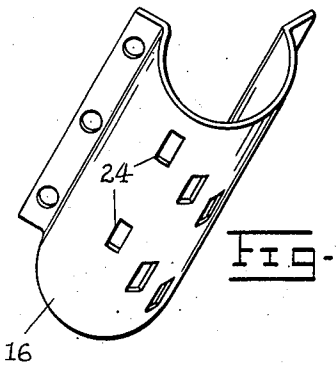


Fig. 6

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NOZZLE FOR STRIPING WEB MATERIALS

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Application October 18, 1954, Serial No. 462,774

3 Claims. (Cl. 118—412)

This invention relates to improvements in nozzles for striping web materials, and more particularly to nozzles for the impregnation of web materials to form ink transfer ribbons and the like, one object being the provision of a more practical and flexible nozzle of this description.

Ink transfer ribbons are customarily manufactured in one or more colors depending on their intended use and the purpose of the machines in which they are to be employed. The colored inks are applied to the ribbon in longitudinal parallel strips, as is well known in the art, with each color closely abutting the adjacent color but preferably not mingling or mixing therewith.

Such ribbons have been manufactured by drawing a strip of porous, flexible material, usually a closely woven cloth, in contact with a nozzle having a rounded surface having a plurality of orifices formed therein and supplied with ink, as is more fully described in the copending application of Neidich, et al., Serial No. 342,876, filed March 17, 1953, now Patent No. 2,766,717 dated October 16, 1956. In this method of manufacturing multicolored ink impregnated ribbons, the transverse dimension of the above mentioned orifices corresponds to the width of one of the colored bands of ink being placed on the ribbon. Each orifice is supplied with the proper color ink under pressure for this purpose.

However, it is often found necessary or desirable to change the number, width, or arrangement of the bands of color on ribbons manufactured for various purposes, and it has heretofore been necessary to provide a different nozzle unit for each arrangement desired. This necessitated the shutting down of the impregnating machine, the disconnecting of the ink supply lines, and the removing and replacing of the entire nozzle unit with another unit containing the desired arrangement of orifices. This was a costly and time consuming operation which interrupted production for a considerable period of time. It further required the provision of a new nozzle unit for each style of ribbon manufactured, the cost of which was often prohibitive, especially in the case of special ribbons manufactured in small quantitites. It is, therefore, another object of this invention to provide a universal nozzle of this description, which may be readily and economically converted to produce any arrangement or combination of colored strips on the ribbon without removing it from the machine.

It has been found also that the sliding motion of the ribbon across the rounded surface of the nozzle causes the latter to wear. In the past, this necessitated the periodic replacement of the entire nozzle unit, which proved both inconvenient and expensive. For this reason, a further object of this invention is to provide an inking nozzle constructed so as to obviate this difficulty in order to reduce maintenance costs to a minimum.

Still further objects include the reduction of the time and expense incurred in changing colors, the provision of a smoother surface to support the ribbon, and the provision of a multicolored ribbon impregnating nozzle

that is simple, positive in operation, reliable, and relatively inexpensive to produce.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a bottom plan view of a nozzle embodying the present invention;

Fig. 2 is a cross sectional view taken substantially along line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of the nozzle of Fig. 1 with the masking plate removed;

Fig. 4 is a perspective view of a masking plate removed from the nozzle body;

Fig. 5 is a schematic fragmentary bottom plan view of the nozzle of Fig. 1 showing a web being striped thereby, and

Fig. 6 is a perspective view of an alternate form of masking plate.

An embodiment of this invention, shown by way of illustration, preferably comprises a nozzle having a body unit **10** generally cylindrical in shape, disposed with its axis or its elements extending in a horizontal direction transversely to the line of travel of the ribbon material being impregnated. The word "cylindrical" is used herein in its broadest sense to describe any convex curved surface generated by a straight line, or element, moving parallel to another fixed straight line, and any solid bounded wholly or partially by such a surface. This type of surface is distinguished by the fact that a flat sheet, such as a strip of flexible ribbon material, may conform thereto by bending in one direction only.

A pair of outwardly extending flanges **12** are mounted on the upper portion of body unit **10** as shown in Fig. 2, and are drilled and threaded to receive bolts **14** or other suitable fastening members. A masking plate **16** is fastened to body unit **10** by means of bolts **14** engaging the threaded holes in flanges **12**, and covers the lower periphery of body member **10**.

Body member **10** contains a plurality of longitudinal, parallel slots, or orifices, **18** in its lower portion as shown in Figs. 2 and 3, and a series of threaded holes **20**, adapted for connection to a source of ink, in its upper portion. Each of holes **20** communicates with a slot **18** by means of an internal passage **22** as shown in Fig. 2. The slots, or orifices, **18** of the body member are spaced in the direction parallel to the path of movement of the web material to be inked and are each elongated in the direction transverse to the path of movement of the web, as shown in Figs. 1 and 3.

Masking plate **16** is pierced by a series of discharge openings which may take the form of spaced longitudinal slits **24** as shown in Fig. 6 or groups of circular holes, or apertures, **25** as shown in Fig. 4. Openings **24** or **25** for each orifice are spaced from each other in directions both parallel to, and transverse to, the path of movement of the web whereby they will register with slots **18** in a staggered relationship when the masking plate **16** is clamped in place as described above as shown in Figs. 1, 2 and 5, so that a continuous passage is formed from holes **20** through passages **22** and slots **18** to respective openings **24** or **25**.

When the nozzle openings take the form of a plurality of small circular holes **25** designed to form one band of color, as shown in Figs. 1 and 4, they must be placed in overlapping relation in the direction transverse to the movement of the ribbon, so that the small band of ink deposited by each small hole will overlap the band deposited by the adjacent hole to form a continuous band of the desired width, as shown in Fig. 5. Conversely, it has been found best to offset the groups of nozzle

holes designed to form adjacent bands of different colors so that a small uninked space is left therebetween as shown at **26** in Fig. 5, to prevent the colors from running together and mingling. Of course, the spacing of holes **24** or **25** may be varied to suit the particular requirements of the ribbon being inked. For example, if the ribbon is to be slit into a number of narrower ribbons in a later operation, as described in the copending application of George G. Neidich, No. 462,815 filed October 18, 1954, it is desirable to leave a somewhat wider uninked band along the line of the prospective slit in order to leave a clean field for the cutting knives.

In use, a continuous strip of the ribbon material to be striped or impregnated is fed across the lower surface of the nozzle as shown in Figs. 2 and 5, with a portion of the material held by roller **30** against and enclosing openings **24** or **25**. Colored inks are fed under pressure from a suitable ink supplying means into openings **20** whence they flow through slots **18** and openings **24** or **25** and penetrate the ribbon as it passes therebeneath. A plurality of parallel bands of different colored inks may be placed on the web by feeding different colored inks into the openings **20** and spacing the openings **24** or **25** in masking plates **16** in the proper relationship so that the strips are positioned as desired. This may be best understood by examination of Fig. 5 which shows a three colored ribbon comprising two strips of each color in the process of manufacture.

As will be seen from the above description, any desired arrangement and width of strips may be produced by suitable arrangement of the nozzle openings and masking plates **16** to produce ribbons as required by the trade, and this arrangement may be altered and a different style of ribbon manufactured by simply substituting a new masking plate **16** containing the desired configuration of openings.

The penetration of the ink into the ribbon may be controlled by varying such means such as the speed and tension of the ribbon, the viscosity of the ink, and the pressure with which the ink is supplied to the nozzle. The latter may be independently controlled for each color ink so that the varying characteristics of each colored ink may be compensated for as desired.

It will thus be seen that the present invention provides a simple and adaptable nozzle for manufacturing ink impregnated ribbons having bands of any desired width, in any combination of colors, spaced in any desired manner. Thus, single or multi-colored ribbons may be manufactured in any combination demanded by the trade by simply providing a suitable orifice plate with desired configuration of holes. Since the orifice plates are inexpensive and readily made from commercial sheet material by standard methods, the cost of changing from one style of ribbon to another is small, and since the plates may be quickly changed, very little production time is lost by each change. Further, body portion of the nozzle unit itself is protected from the frictional wear caused by the sliding motion of the ribbon passing thereunder by masking plates **16**, which may be quickly and easily replaced when worn out.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of preferred embodiments, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

We claim:

1. A device for impregnating a web with a plurality of bands of ink from an ink supply means, comprising means for moving the web in a fixed path, a nozzle member having a curved surface and a plurality of ink orifices formed therein, said orifices being spaced in the direction parallel to the path of movement of the web and elongated in the direction transverse to the path of movement of the web, ink passages within the nozzle communicating with the ink supply means and terminating at the orifices, a thin curved masking plate covering the nozzle orifices and formed with a plurality of discharge openings at least one for each orifice, for confining the flow of ink only therethrough, said opening for each orifice being spaced from the others in directions both parallel to, and transverse to, the path of movement of the web, and means for securing said masking plate to said nozzle member whereby said openings register with their corresponding orifices in a staggered relationship.

2. A device as set forth in claim 1 wherein the discharge openings in the masking plate for each orifice are formed as a series of separate apertures in overlapping relation with respect to each other in the direction transverse to the path of movement of the web.

3. A device for impregnating a web with a plurality of bands of ink from an ink supply means, comprising means for moving the web in a fixed path, a nozzle member formed with a plurality of ink orifices spaced in the direction parallel to the path of movement of the web and elongated in the direction transverse to the path of movement of the web, ink passages within the nozzle communicating with the ink supply means and terminating at the orifices, a thin masking plate covering the nozzle orifices and formed with a plurality of discharge openings at least one for each orifice, for confining the flow of ink only therethrough, said opening for each orifice being spaced from the others in directions both parallel to, and transverse to, the path of movement of the web, and means for detachably securing said masking plate to said nozzle member to register the openings of the masking plate in a staggered relationship with respect to their corresponding orifices in the nozzle member.

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