May 6, 1958 G. G. NEIDICH 2,833,666

METHOD OF MAKING INK TRANSFER RIBBONS

Filed Oct. 18, 1954 2 Sheets-Sheet 1

FIG. 1

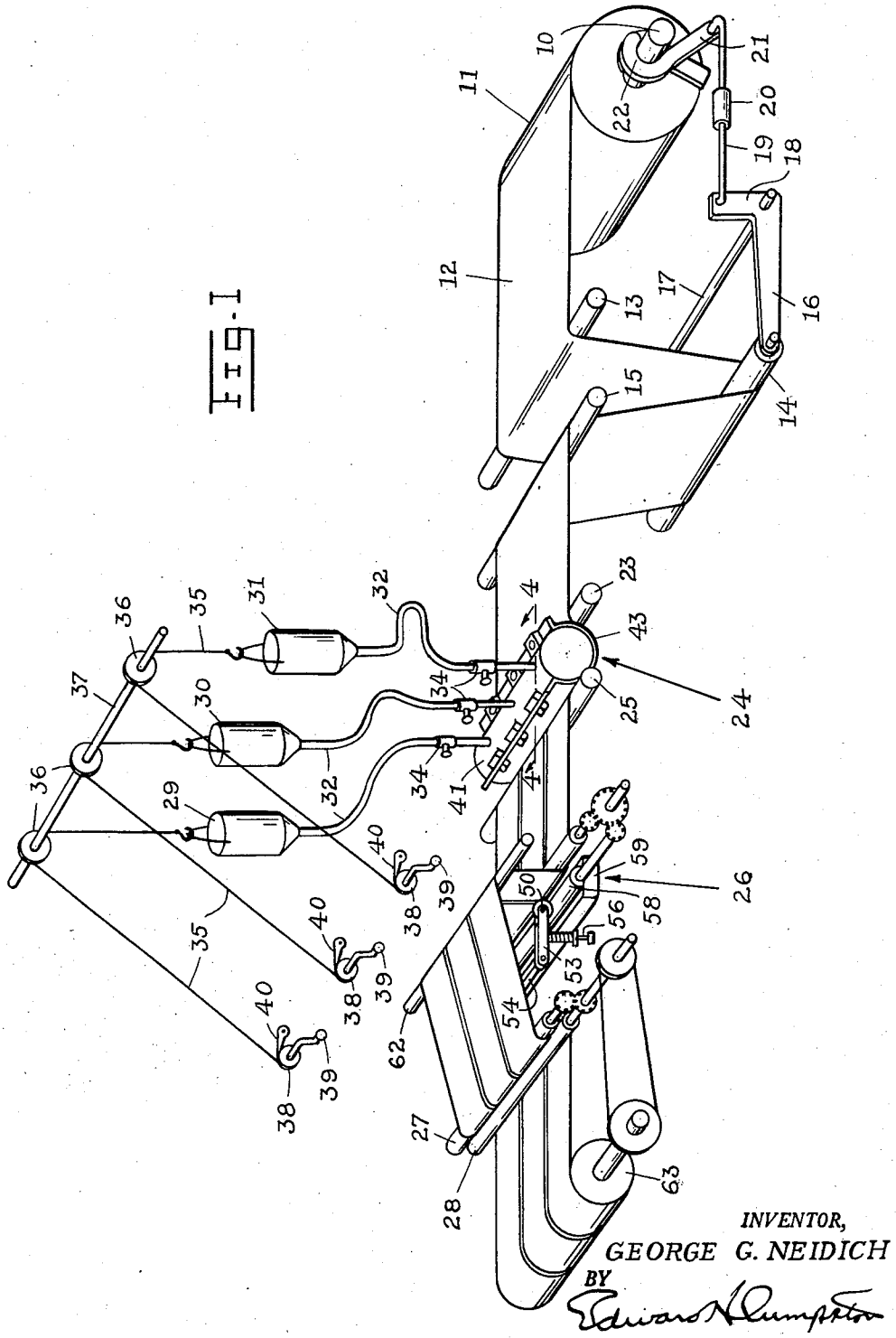

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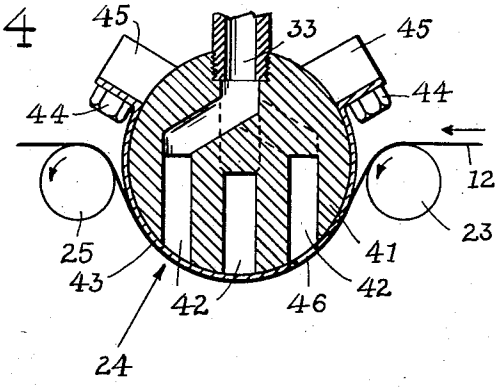
Fig. 4



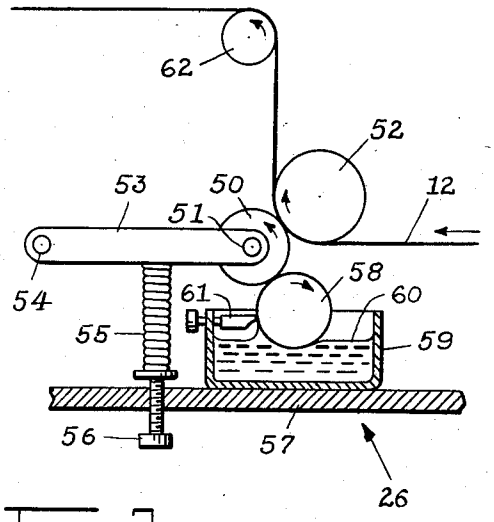


Fig. 2

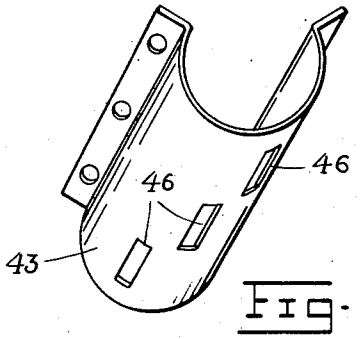


Fig. 5

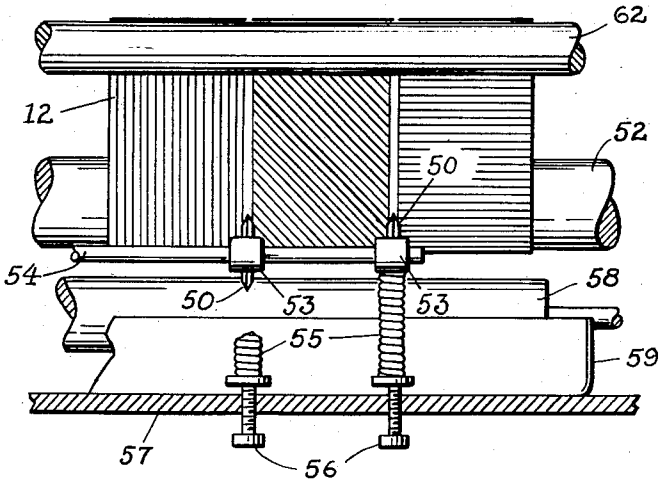


Fig. 3

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METHOD OF MAKING INK TRANSFER RIBBONS

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Application October 18, 1954, Serial No. 462,815

2 Claims. (Cl. 117—4)

This invention relates to a method of manufacturing ink transfer ribbons and more particularly, for the quantity manufacture of ink transfer ribbons such as those employed on typewriters and other printing devices, one object of this invention being the provision of a more rapid, economical and efficient method of carrying out this object.

Ink impregnated ribbons of this description have been commonly manufactured by forming a ribbon of textile or other suitable material of the desired ribbon width and with selvage edges and impregnating it with ink. This, however, has proved to be an expensive and time consuming procedure, unsuited for low cost, high volume production of these articles. Another object of this invention, therefore, is to provide a more facile and economical method for producing ink impregnated ribbons in quantity by continuously impregnating a relatively wide moving web with ink, and simultaneously slitting said web into a number of ribbons of the proper width for use in ribbon printing devices.

Such slitting of an ink impregnated web, however, produces ribbons which tend to unravel at their slit edges, thereby producing an unfinished, unsightly and unsatisfactory product. Furthermore, the ink from the web tends to foul the slitting mechanism and intermingle inks of different colors, thus defacing the ribbons. Another object is to solve these problems by the provision of an efficient method which binds the ribbon edges as they are cut or slit, and without commingling the respective inks.

Further objects include the provision of a method of inking and slitting ink transfer ribbons that is practical, economical and readily adaptable to various requirements and which does not require the use of complicated and expensive equipment.

To these and other ends the invention resides in certain improvements and combinations of parts and method steps, 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 schematic perspective view of an apparatus embodying the present invention;

Fig. 2 is an enlarged schematic elevational view, partly in section, of the slitting means shown in Fig. 1;

Fig. 3 is an enlarged fragmentary schematic elevational view of the slitting means shown in Fig. 2;

Fig. 4 is an enlarged fragmentary sectional view taken substantially along line 4—4 in Fig. 1; and

Fig. 5 is a perspective view of a masking plate removed from the nozzle.

A machine embodying the present invention as shown by way of illustration preferably comprises a shaft **10** adapted to support and rotate a roll **11** of web or ribbon material **12** of any desired width, but preferably wide enough to form a plurality of ribbons. From the roll **11** the ribbon passes over an idler roll **13**, under a brake or tension controlling roller **14** and up over another idler roller **15**. The tension roller **14** is rotatably mounted

on a lever **16** pivotally mounted on a spindle **17**. The lever has an arm **18** extending at substantially right angles to the arm carrying roller **14**, and this angular arm is pivotally connected with a link or rod **19**. Rod **19** has a collar or other suitable length-adjusting means **20**, and its other end is pivotally connected with one arm **21** of a brake shoe **22** forming one of a pair of pivotally-connected shoes of known variety, arranged to frictionally engage and brake the rotation of shaft **10** of the ribbon supply roll.

It will be seen from the above description that when tension in the ribbon falls below a desired degree, roll **14** is lowered so as to exert a pull on rod **19** and operate the brake shoes to apply resistance to the rotation of the ribbon supply roll and thus increase the ribbon tension. By adjusting the collar **20**, the optimum positions of the tension roll **14** and brake lever **16** are established for automatically maintaining the desired degree of tension in the ribbon. While a tensioning device of the above character has been successfully employed, it is contemplated that other known tensioning devices may be substituted, such as a hydraulic or electric relay system, as well understood in the art, as the particular details of this device form no part of the present invention.

From the above tensioning device, the ribbon passes over an idler roller **23** and thence across and against an ink-supply nozzle head indicated generally at **24**, forming part of an ink supply means and constructed as hereinafter described. From this nozzle of the ink supply means, the ribbon passes over another idler roll **25**, through the slitting and binding means shown generally at **26**, and thence between a pair of driving or feed rollers **27** and **28**, rotated by means hereinafter described for feeding the ribbon across the said nozzle. As shown, the idler rolls **23** and **25** are so positioned that the intermediate free portion of the tensioned ribbon is pressed against the nozzle orifices to close the same against any free discharge of ink.

The ink supply means comprises means for holding a supply of ink of each of one or more colors and forcing it under pressure to the corresponding orifice of the nozzle means **24**. While such supply means may obviously take various forms, whe have found it advantageous to employ a gravity head pressure on the ink at the discharge orifice and for this purpose have employed ink reservoirs or containers **29**, **30** and **31**, one for ink of each different color. The bottom of each reservoir is connected by a flexible tube **32** with a passageway **33** in the nozzle head **24** (Figs. 1 and 4), each tube being controlled by a valve **34**. Each container is supported in the present instance by a cable as **35** running over a pulley **36** on a spindle **37** and thence to a pulley or drum **38** rotatably supported on a standard (not shown) and rotated by means of a hand crank **39**, as shown. By turning the crank and retracting or paying out the cable, the corresponding container is raised or lowered so as to increase or decrease the gravity head and the pressure of the ink in the discharge orifice. Each drum **38** is provided with a latching pawl **40** or other known and suitable means for releasably securing it in adjusted position.

While nozzle head **24** may be of any desired construction, it has been found that the interchangeable orifice type disclosed and claimed in copending application Serial No. 462,774, filed October 18, 1954, is particularly useful for this purpose. This type of nozzle comprises a solid cylindrical body **41** (Fig. 4) extending transversely to the path of movement of the ribbon. A plurality of openings **33**, one for each color of ink to be used, are drilled in the upper surface of body **41** to form inlets which are connected to flexible tubes **32**, as described above. Each opening **33** communicates with a longitudinally extending slot **42** formed in the lower surface of the body **41**, in

the portion of the circumference thereof contacted by the moving ribbon. These slots are covered by a thin flexible metal masking plate **43** which is held in place by bolts **44** engaging threaded holes in lugs **45**, on body portion **41**. Masking plate **43** (Fig. 5) is pierced by a series of openings or slits **46** registering with slots **42** and having a longer dimension corresponding with the width of a colored band to be placed on the ribbon.

The various colored inks pass through the openings **33**, and thence to slots **42** which are in register with the openings **46** in plate **43**. As the ribbon passes under the nozzle head **24**, in contact with plate **43** as described above, the ink issuing from each opening **46** is deposited on the portion of the ribbon passing thereunder in the form of a band of uniform width.

The amount of ink placed on the ribbon may be closely controlled by varying the pressure of the ink supply by raising or lowering the ink reservoirs as described above, the speed and tension of the ribbon, or the width of openings **46** in the direction parallel to the movement of the ribbon. Obviously, these factors are controlled by the character of the ribbon being impregnated, the viscosity of the ink, and the purpose for which the ribbon is intended.

A number of interchangeable masking plates **43** containing different arrangements of openings **46** may be provided to allow the impregnation of different arrangements of colored ribbons, as is more fully described in the above mentioned copending application covering the construction of the nozzle head. However, as stated above, this invention is not dependent on the method of applying ink to the ribbon, as any practical method could be used.

The slitting means **26** (Figs. 1, 2, and 3) preferably comprises a spaced series of circular knives **50** mounted on transversely extending shafts **51**, and resiliently held in contact with an anvil roller **52**. Shafts **51** are rotatably mounted in movable frames **53** which, in turn, are pivoted on axis **54** parallel thereto. Circular knives **50** are held in resilient contact with anvil roller **52** by means of helical springs **55** connected to frames **53** and to screws **56** which threadedly engage a portion **57** of the frame of the machine. The tension of springs **55** may be controlled by adjustment of screws **56** to adjust the force with which the knives bear against the anvil.

Circular knives **50** rotate in contact with a glue roller **58** which rotates in a trough **59** containing a supply of glue or other similar substance **60** (Fig. 2) maintained at a constant level by some suitable and known device (not shown). The surface of roller **58** picks up a film of glue and transfers the same to the periphery of circular knives **50** which, in turn, transfer it to the fibers of the ribbon material as they are being cut. The thickness of the film of glue carried by the roller is regulated by an adjustable doctor blade **61** which scrapes the excess glue from the portion of the surface of roller **58** leaving the trough. The glue is thus applied to the fibers simultaneously with the cutting thereof, binding the extreme ends thereof, adjacent to the cut, thereby preventing them from unraveling.

Since the sharp edges of circular knives **50** can carry only a very small amount of glue, and since this glue is applied on to the portions of the ribbon directly adjacent to the slit edges thereof, the glue cannot interfere with the inked surface of the ribbon. In this manner, the edges of the ribbon are effectively bound to prevent raveling, but the efficiency thereof is not adversely affected.

After being slit and glued, the ribbons travel upwardly over an idle roller **62**, through driving rollers **27** and **28**, and thence to a take up roll or spool **63**. These parts are driven by any suitable and known means, such as an electric motor. If necessary, suitable drying means may be interposed between idle roller **62** and driving rollers **27** and **28** to accelerate the drying of the glue.

In this manner, a plurality of ribbons may be manufactured in one operation from a single wide strip of material. The width and arrangement of the bands of color may be conveniently varied by varying the arrangement of the openings in masking plate **43**. The widths of the finished ribbons are controlled by varying the transverse spacing of the circular knives. Thus, it is possible to manufacture any combination of ribbons, single or multicolored, wide or narrow, as desired. All of the cut edges of these ribbons are automatically sealed or bound by a thin film of glue to prevent unraveling, to seal the ink impregnant from any substantial migration through the cut edges, and to present a finished appearance.

In practice, it has been found desirable to use quick-drying adhesives of the type containing volatile solvents for the binding purposes described above. Most of these materials are not compatible with the usual types of inks used for the manufacture of ink transfer ribbons, and therefore will not readily adhere to ink saturated fibers. In order to overcome this difficulty, it has been found desirable to leave a narrow strip of uninked material along the edges of each ribbon. This is easily accomplished by controlling the laterial spacing of the openings **46** in masking plate **43** so that adjacent bands of ink are laterally spaced, and slitting the material along the resulting uninked strip, as shown in Fig. 3, the ink impregnant not having sufficient time to migrate to the slitting line at the time of slitting. This not only improves the binding power of the adhesive, but avoids staining the slitting knives with ink, keeping the operation neat and clean. Moreover, since the binding material is applied to the ink-free slit edges immediately after impregnating the web, the ink may migrate right up to the edges of the ribbon, thus producing a maximum ink-carrying surface with a minimum of migration through the bound edges thereof.

Thus, this invention accomplishes its stated objects in providing a practical way for manufacturing a large number of differing ink impregnated ribbons in one operation. The arrangement of the colors and the width of the finished ribbons may be varied through an almost infinite variety of combinations to suit the requirements of the trade. Thus, this invention provides an extremely versatile and flexible means for the manufacture of ink impregnated ribbons in quantities at very low cost.

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

I claim:

1. The method of simultaneously manufacturing a plurality of separate ink transfer ribbons of the same or different colors comprising the steps of feeding a continuous web in contact with a plurality of laterally spaced inking means of the desired color for impregnating same with parallel bands of ink with each band being separated by a narrow uninked strip, cutting said web in lines between adjacent bands along the uninked strips, and applying to the cut edges of the web a liquid adhesive binding material, said web being cut before the ink has sufficient time to migrate to the cutting line and said binding material being applied before the ink impregnant has sufficient time to migrate to the cut edges, whereby the cutting of the web along the uninked strips avoids staining of the cutting means, the application of the binding material to edges which are ink-free produces more strongly bonded edges, and the application of the binding material only to the cut edges permitting the migration of the ink impregnant thereto produces ribbons having increased ink-carrying surfaces.

2. The method defined in claim 1 wherein the steps

of cutting the web and applying the binding material are performed simultaneously.

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