Dec. 27, 1955 H. P. MURPHY ET AL 2,728,439

TYPEWRITER RIBBON

Filed Aug. 26, 1954

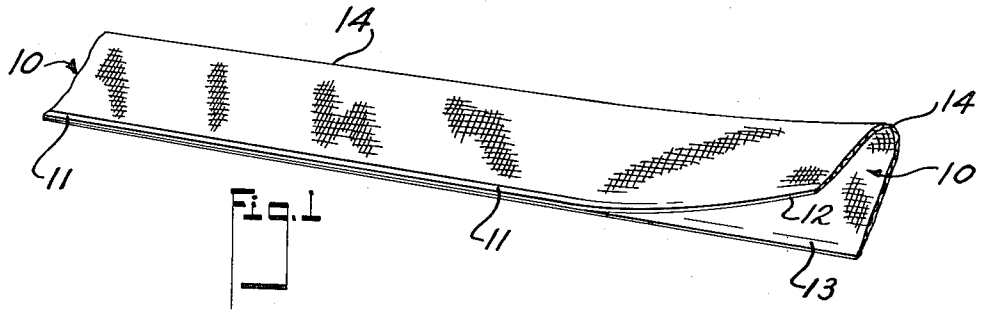

Fig. 1

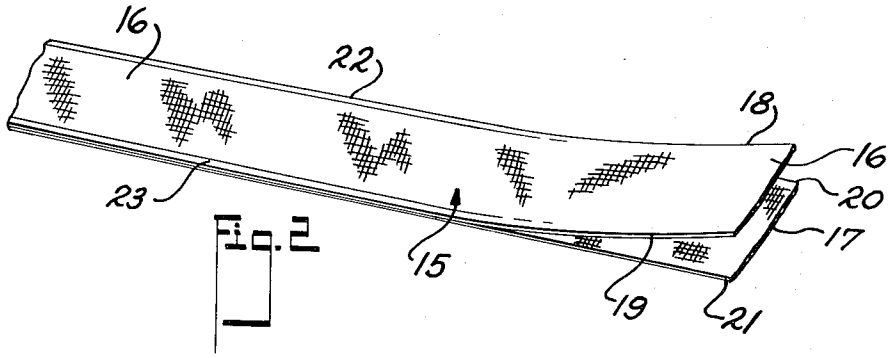

Fig. 2

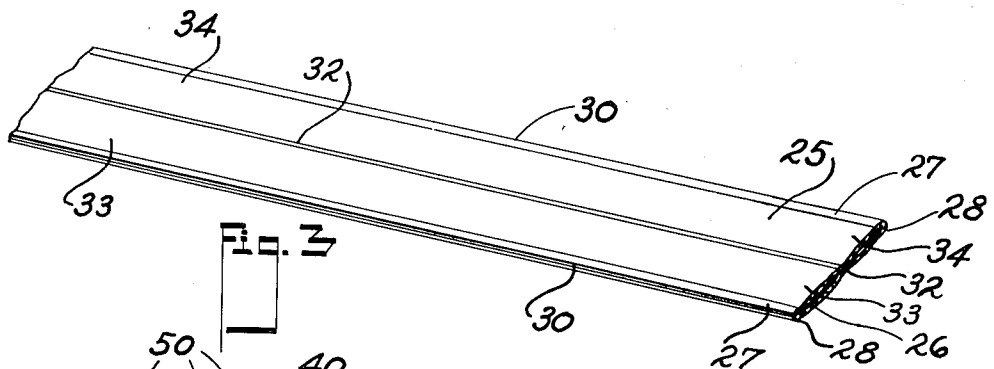

Fig. 3

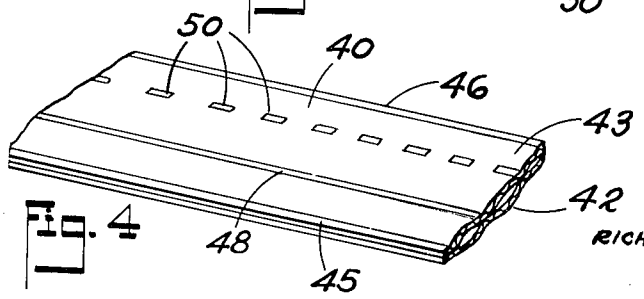

Fig. 4

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TYPEWRITER RIBBON

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5 Claims. (Cl. 197—172)

The present invention relates generally to the printing art and is more particularly concerned with a novel, heavy-duty, typewriter ribbon which has unusually long useful life, even under the severest conditions, and which produces good, clear impressions over substantially its entire period of use regardless of the conditions of its use.

The conventional typewriter ribbons heretofore available on the market have left much to be desired from the standpoint of the average length of service and their ability to withstand the severe conditions of typing created by the present day electric typewriters and other modern business machines.

We are acquainted with efforts that have been made by others in the past to develop some means by which these ribbons could be conditioned for rigorous use and their average lives thereby materially prolonged. However, to the best of our knowledge, none of these efforts has resulted in either a satisfactory increase in the ruggedness of conventional ribbons or in the development of a new heavy-duty ribbon having any practical utility or value.

We have, by virtue of the present invention, eliminated the difficulties of the prior ribbons, including both conventional and non-commercial, or experimental types. Furthermore, we have accomplished this result without creating any significant offsetting disadvantage. Accordingly, as a result of this invention, it is now possible for the first time, to the best of our knowledge, to provide a typewriter ribbon which will last in use far longer under severe service conditions than the ribbons of the prior art.

Another unusual feature of our ribbon is its cushioning effect when struck a severe blow with the type of an electric typewriter. This cushioning effect results in the elimination or reduction of the tendency of the type to perforate or indent the original copy of the form being typed.

Other important advantages of the present invention will become clear to those skilled in the art, as will the particular nature of this invention, upon consideration of the detailed description set forth below, reference being had to the drawings accompanying and forming a part of this specification, in which:

Fig. 1 is a fragmentary, perspective view of a typewriter ribbon embodying this invention;

Fig. 2 is a similar view of a typewriter ribbon embodying this invention in preferred form;

Fig. 3 is a similar view of another typewriter ribbon representing a third embodiment of this invention; and,

Fig. 4 is a similar view of still another typewriter ribbon embodying this invention in another form.

In general, as is apparent from the drawings, a typewriter ribbon of this invention comprises an elongated, relatively-narrow, edge-welded, multi-ply, web-like body of fusible fabric such as nylon, the body being saturated with a non-drying fluid ink composition and having opposed longitudinal edge portions integrally united by a

ravelling-proof, tear-resistant weld extending the full length of the body and constituting a narrow marginal zone of relatively dense, non-porous, substantially ink-impervious material.

With reference particularly to Fig. 1, the ribbon therein illustrated comprises an elongated strip or band **10** of nylon fabric which is doubled lengthwise and secured by means of a weld **11** along its free edge portions **12** and **13**. In doubled form, ribbon **10** is substantially the width of the conventional typewriter ribbons so that it is adaptable to use in the ordinary machines. As indicated above, and shown in Fig. 1, weld **11** extends the full length of the ribbon body. Folded edge **14**, as also indicated in this drawing, is creased sharply in any suitable manner in order that the ribbon will not tend to wrinkle or otherwise distort in ordinary use in such a manner or in such a degree that it would impair the operation of the machines on which it is installed. In the preferred practice of this invention, ribbon **10** is folded so that there is essentially no detectable difference in bulk or shape between its two longitudinal edge portions.

Ribbon **15** of Fig. 2 is composed of two relatively narrow, elongated strips of nylon fabric **16** and **17** which are disposed face to face and joined along opposed longitudinal edge portions (**18**, **19** and **21**, **21**) by two substantial continuous welds **22** and **23**. Accordingly, ribbon **15** is of substantially the same width as ribbon **10** of Fig. 1 and heretofore conventional typewriter ribbons. It will be understood, however, that the width dimension of these ribbons may be varied to suit the needs of the user.

Welds **22** and **23** are preferably created in the same manner as weld **11** and the edge portions of this Fig. 2 ribbon are therefore essentially of the same bulk as the edges of ribbon **10**. Consequently, in use, there is no problem of bulking or fouling of ribbon **15** in a typewriter and all the advantages stated above and inherent in the Fig. 1 ribbon are also to be obtained from this Fig. 2 ribbon.

In Fig. 3, the ribbon illustrated is, in fact, a variation of the one illustrated in Fig. 2. Consequently, the Fig. 3 ribbon comprises two relatively narrow, elongated strips **25** and **26** of nylon fabric joined along opposed longitudinal edge portions **27** and **28** by means of welds **30** extending substantially from end to end of the ribbon. Here again, as illustrated in Fig. 2, the two longitudinal edges of the ribbon are essentially of the same dimensions to assure that the ribbon will not foul in use or otherwise interfere with the operation of the machine upon which it is employed. This Fig. 3 article is provided in addition with an intermediate weld **32** extending the full length of the ribbon as a narrow band serving to divide the ribbon into two longitudinal segments **33** and **34** of substantially the same dimensions. Weld **32** serves to position the plies of strips **25** and **26** with respect to each other and to hold them in such position throughout the period of their use. Thus the tendency for the intermediate positions of the plies to shift about in use, particularly as the ribbon becomes worn substantially, is eliminated, making the use of such multi-ply ribbons applicable as a practical matter to two-color ribbon manufacture and use. In the two-color ribbons of this form of our invention, the intermediate weld is preferably located along the boundary between the colors, regardless of whether one color band is materially wider than the other. In single color ribbons the intermediate weld is preferably centered with respect to the ribbon for maximum stabilizing and supporting effect upon the portions of the two plies of the separate ribbon sections.

In Fig. 4, ribbon **40** is shown as being of the Fig. 2 type and comprising two elongated strips **42** and **43** of matching dimensions and shape joined along their longitudinal edge portions by continuous welds **45** and **46**. A weld

48 extends the full length of ribbon 40 along a line to one side of the longitudinal center line and serves to hold the adjacent portions of strips 42 and 43 in assembled relation to each other. On the other side of the longitudinal center line the said strips are welded together and held in place by means of a plurality of spot or tack welds 50 which are substantially aligned lengthwise of the ribbon.

Welds 11, 22, 23, 30, 32, 45, 46, 48 and 50 may be provided or created in any suitable manner known to those skilled in the art. In accordance with our preference, however, the ribbon edge portions are joined by welds produced by the application of a hot element or iron against the parts to be welded together. A hot knife may be used for this purpose since nylon fabric can be fused readily under such circumstances and in fact is conventionally fused and cut in single ply by this means. Actually, in the drawings, the width of the weld in each instance has been exaggerated, as those skilled in the art will understand, in order to indicate more clearly the novel structure of our ribbons. It is, in fact, to be desired that the weld be as narrow as possible, particularly along the edge portions of the ribbon to avoid any tendency toward bulking, wrinkling or other deformation of the ribbon in use with resultant difficulty in operation of machines using these ribbons. Welds 32, 48 and 50 may suitably be substantially wider than the marginal welds if desired for any purpose, but it will be understood that their principal purpose will be served by a narrow weld as a seam or spot (50). These welds, accordingly, may be made by bringing into contact with ribbon 25 a heated element of working edge shape and dimensions substantially corresponding to the shape and dimensions of the weld desired.

From the foregoing description, those skilled in the art will understand that the ribbons of this invention afford substantial and important advantages over the prior art including the presently commercially employed ribbons as well as those ribbons which have been developed, tested and abandoned for one reason or another, or a combination of ribbons as mentioned above. Thus, for example, the multi-ply ribbons with stitched edge portions known in the prior art do not afford the trouble-free use that the ribbons of the present invention offer due largely to the fundamental difference between the construction of the marginal portions of these ribbons. Furthermore, in respect to the forms of this invention illustrated in Figs. 3 and 4, the multi-ply ribbons of the prior art do not have the long life of these ribbons and are not at all satisfactory for use as multicolor items.

The nylon fabric employed in the manufacture of the ribbons of this invention are preferably approximately the same weave and density as the nylon fabrics of the ribbons now in general commercial use. Typical fabric suitable for use in the manufacture of ribbons of this invention is of caliper (thickness) about 0.0040 inch and of thread count about 288 per square inch. However, it will be understood that fabrics of other weights and thread counts may be used to obtain the advantages of this invention and that the manufacturer of these ribbons may use materials other than nylon to obtain these advantages. The important thing is that the material or fabric be such that it can be welded and otherwise processed as described above to produce a ribbon having the structure defined in the claims and the special advantages of long service life under severe conditions.

The inks preferred for use in accordance with this invention are those conventional typewriter ribbon inks of commerce well-known to those skilled in the art. As described above, these inks are of the non-drying fluid type and it will be understood that any ink of this general description may be used for the purposes of this invention.

As used herein the word "multi-ply" means and includes two-ply and more than two-ply constructions.

Having thus described the present invention so that those skilled in the art may be able to understand and practice the same, we state, that what we desire to secure by Letters Patent is defined in what is claimed.

What is claimed is:

1. A heavy-duty typewriter ribbon especially adapted for use in electric typewriters and other business machines and having good clear impression qualities and unusually long useful life which comprises an elongated, narrow, edge-welded, multi-ply, web-like body of nylon fabric having superior ink capacity and absorbency characteristics, said body being saturated with a non-drying fluid ink composition and having opposed longitudinal edge portions integrally united by a ravelling-proof and tear-resistant weld extending substantially from end-to-end of the body and constituting a narrow marginal zone of relatively dense, non-porous, substantially ink-impervious material.

2. A heavy-duty typewriter ribbon especially adapted for use in electric typewriters and other business machines and having good clear impression qualities and unusually long useful life which comprises an elongated, narrow, edge-welded, two-ply, web-like body of nylon fabric having superior ink capacity and absorbency characteristics, said body being saturated with a non-drying fluid ink composition and having two ravelling-proof and tear-resistant welds extending substantially from end-to-end of the body along its lateral extremities and constituting a narrow marginal zone of relatively dense, non-porous, substantially ink-impervious material.

3. A heavy-duty typewriter ribbon especially adapted for use in electric typewriters and other business machines and having good clear impression qualities and unusually long useful life which comprises an elongated, narrow, edge-welded, two-ply, web-like body of nylon fabric having superior ink capacity and absorbency characteristics, said body being saturated with a non-drying fluid ink composition and having a folded and creased longitudinal edge portion and a second longitudinal edge portion having a ravelling-proof and tear-resistant weld extending substantially from end-to-end of the body and constituting a narrow marginal zone of relatively dense, non-porous, substantially ink-impervious material.

4. A heavy-duty typewriter ribbon especially adapted for use in electric typewriters and other business machines and having good clear impression qualities and unusually long useful life which comprises an elongated, narrow, edge-welded, two-ply, web-like body of nylon fabric having superior ink capacity and absorbency characteristics, said body being saturated with a non-drying fluid ink composition and having two ravelling-proof and tear-resistant welds extending substantially from end-to-end of the body along its lateral extremities and constituting a narrow marginal zone of relatively dense, non-porous, substantially ink-impervious material, and an intermediate weld extending substantially from end-to-end of the ribbon and bonding opposing intermediate portions of the two sides of the ribbon together.

5. A heavy-duty typewriter ribbon especially adapted for use in electric typewriters and other business machines and having good clear impression qualities and unusually long useful life which comprises an elongated, narrow, edge-welded, two-ply, web-like body of nylon fabric having superior ink capacity and absorbency characteristics, said body being saturated with a non-drying fluid ink composition and having two ravelling-proof and tear-resistant welds extending substantially from end-to-end of the body along its lateral extremities and constituting a narrow marginal zone of relatively dense, non-

porous, substantially ink-impervious material, and a plurality of intermediate welds disposed substantially lengthwise of the ribbon and dividing said ribbon into a plurality of longitudinal sections and maintaining the opposite sides of the ribbon in predetermined fixed relation to each other in use.

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