Sept. 9, 1930. C. H. GRAY 1,775,392

ROLLER COVERED WITH RUBBER OR OTHER RESILIENT MATERIAL

Filed Oct. 24, 1927

Fig. 1.

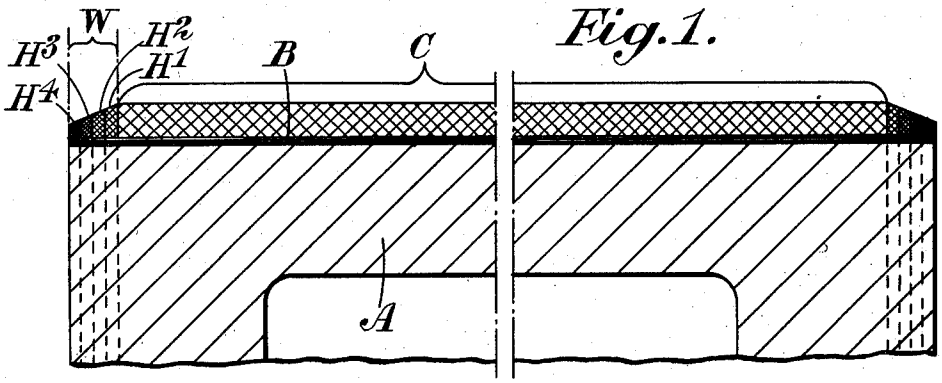


Fig. 2.

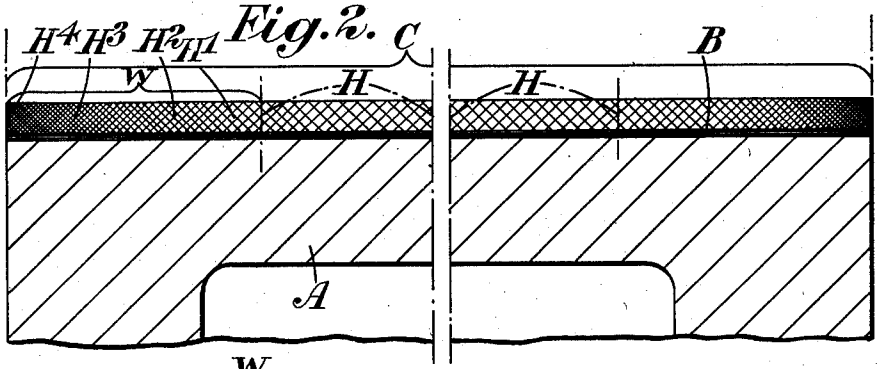


Fig. 3.

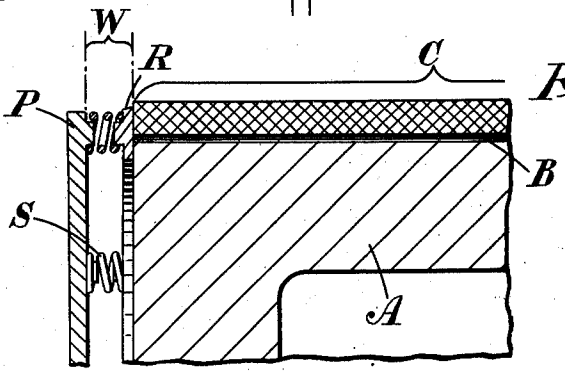
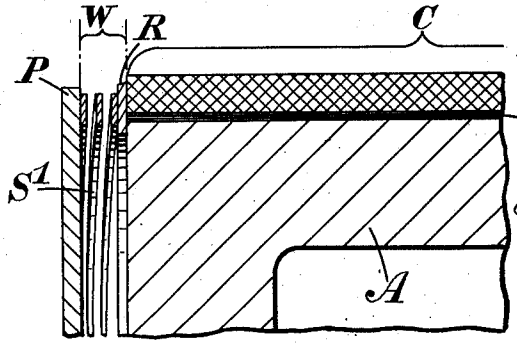


Fig. 4.



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UNITED STATES PATENT OFFICE

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ROLLER COVERED WITH RUBBER OR OTHER RESILIENT MATERIAL

Application filed October 24, 1927, Serial No. 228,163, and in Great Britain November 19, 1926.

This invention consists in improvements in or relating to rollers covered with rubber or other resilient material such as are used in paper-making machines, printing machines and in machines for many other manufactures and trades.

It has been found that the coverings of such rollers tend to wear very much more rapidly adjacent the ends of the rollers than at the centre portions thereof. This is particularly the case in rubber-covered rollers used in paper-making machines.

The object of this invention is to provide a roller covered with rubber or other resilient material, the covering of which wears approximately uniformly across substantially the whole width of the surface of the roller.

It has been found by the present inventor that the excessive wear of the covering of the roller adjacent the ends thereof is due to the resistance to deformation of the covering of the roller adjacent said ends being different from that of the covering at the centre portion of the roller. Heretofore the end portions and the centre portions of rollers have been covered with resilient material having per se the same resistance to deformation; but since the end portions of the covering are not supported on both sides by adjacent portions of the covering, as is the centre portion, the covering of the covered roller has been much less resistant to deformation adjacent said ends than at the centre of the roller.

According to this invention a roller covered with rubber or other resilient material is constructed with resilient devices situated on the roller for supporting the ends of the covering in such a manner as to ensure that resistance to deformation of the covering is approximately uniform across substantially the whole width of the roller.

The required uniformity of resistance to deformation may be obtained in a number of ways.

In the accompanying drawings which illustrate constructions of roller according to the present invention:

Figure 1 is a longitudinal section of part of one side of a roller;

Figure 2 is a similar view of another construction of roller, and

Figure 3 is a similar diagrammatic view of one end of a third construction.

Figure 4 shows a modification of the construction shown in Figure 3.

Like references indicate like parts throughout the drawings.

A is a portion of the body of the roller, B is the hard rubber base-covering thereon, and C is the outer covering encircling the base-covering B. In the drawings, the density of section-lining in the coverings C or in the rings hereinafter described, varies according to resistance to deformation of the material, i. e. the denser the section-lining the greater the resistance or hardness; hence the drawings indicate at the places marked H that the material of the cover C at those places is of a chosen hardness or resistance, and that at the places marked in sequence H^1, H^2, H^3, H^4 the hardless or resistance is greater in inverse proportion to their nearness to the adjacent end of the roller, reaching a maximum at H^4.

In Figure 1 the letters H^1, H^2, H^3, H^4 in addition to indicating relative resistances or hardnesses, as aforesaid, are used to indicate also separate rings H^1, H^2, H^3, H^4 placed side by side to constitute a compound end-piece forming an end for supporting the covering C.

These circumferential rings H^1, H^2, H^3, H^4 of material such as rubber (or H^4 may be of ebonite) of suitable resistance to deformation substantially greater than that of the material constituting the outer covering C, are secured by vulcanization or otherwise in position against each end of the covering C. The characteristics of the said rings and their size depend on the difference in resistance to deformation that would formerly have existed between the portion of the covering C adjacent the ends and that at the centre of the covering. The rings will constitute end portions which can be tapered, as illustrated in Figure 1, to a degree which is suited to the quality and other characteristics of the said covering.

In Figure 2 the covering C adjacent to the

ends of the roller in the widths W thereof may consist of material which at H^1, H^2, H^3, H^4 is, per se, more resilient to deformation than is, per se, the material at the points H of the covering. In this case the material may be graduated from material at H^4 of, per se, the greatest resistance to deformation at the extreme ends of the roller, to material at H of resistance to deformation which is, per se, the same as that at the centre of the roller at a substantial distance from said ends.

In Figure 3, floating rings R of rigid material, such as hard rubber, wood or even metal, are positioned to bear against the ends of the resilient covering C of the roller, the said rings being spring-pressed thereagainst by a plurality of springs S positioned between said rings and pressure-plates P secured to the shaft or to the body portion of the roller and extending transversely in relation to the axis thereof.

Figure 4 shows a similar construction to that shown in Figure 3, wherein the springs S are replaced by a single helical spring S^1.

The portion of the covering C occupying the width W thereof in Figure 2 and also the device occupying the width W of the roll in Figures 1, 3 and 4 are devices for the purpose of affording to the end-faces of the covering C support to such a degree against the tendency of the ends to deform under pressure applied to the circumference of the said roller that these end-faces, and such sections of the ends of the covering as are parallel to the end-faces, are as much supported as is any parallel section situated nearer to the middle of the width of the covering.

In a roller constructed as above described with reference to Figure 1, the undermentioned dimensions and data have been found to give satisfactory results:—

Length of the roller A	13 ft. 9 inches.
Covered diameter of the same	25¾ inches.
Thickness of hard rubber base-covering B	1/8th inch.
Thickness of softer covering C	½ inch.
Length of end-pieces	¾ inch.

The four rings H^1, H^2, H^3, H^4 are each $\frac{3}{16}$ths of an inch and are chamfered off at an angle of 22½ degrees.

Plastometer hardness figures for the various parts are:—

Covering C	70–74.
Ring H^1	45.
Ring H^2	35.
Ring H^3	25.
Ring H^4	0 (ebonite)

The relative diameters of roller A and a top roller which rested upon it were in this case 1:1.

The weight on the roller was 57.4 lbs. per square inch at the contact areas.

The foregoing data as to the 13 ft. 9 inches roller are given by way of example only and are not intended to limit in any way the scope of the present invention.

While this invention is particularly applicable to rollers covered with rubber, it is understood that it is not limited thereto and may be applied to rollers covered with other resilient material.

I claim:—

1. The combination of a roller and a resilient covering therefor that comprises a central section and end sections, each of which end sections is constituted by a plurality of zones of resilient material each of uniform resilience throughout its cross-section and said zones of each end section progressively decreasing in resilience from the inner to the outer of the zones for the purpose described.

2. The combination of a roller and a resilient covering therefor that comprises a central section and end sections which are tapered in such a manner that the diameter of the resilient covering at its ends is less than the diameter of the said central section, each of which end sections is constituted by a plurality of zones of resilient material each of uniform resilience throughout its cross-section and said zones of each end section progressively decreasing in resilience from the inner to the outer of the zones for the purpose described.

In testimony whereof I affix my signature.

CHRISTIAN HAMILTON GRAY.