Sept. 20, 1927. 1,643,117

C. GUSTAVSON

APPARATUS FOR APPLYING A LUBRICANT TO PAPER

Filed June 9, 1925 2 Sheets-Sheet 1

Fig. 1

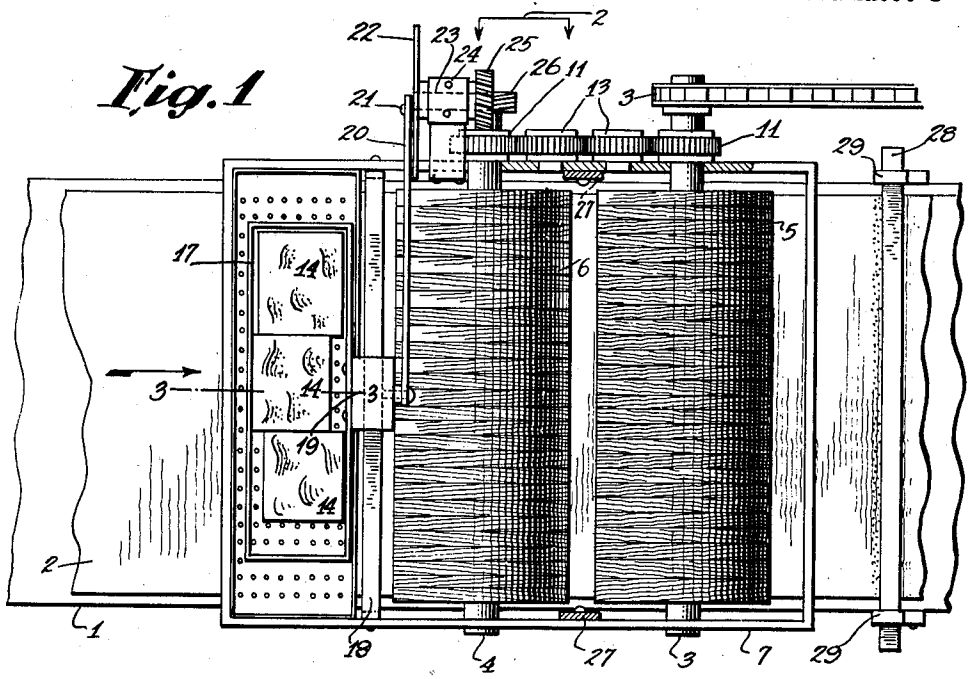


Fig. 2

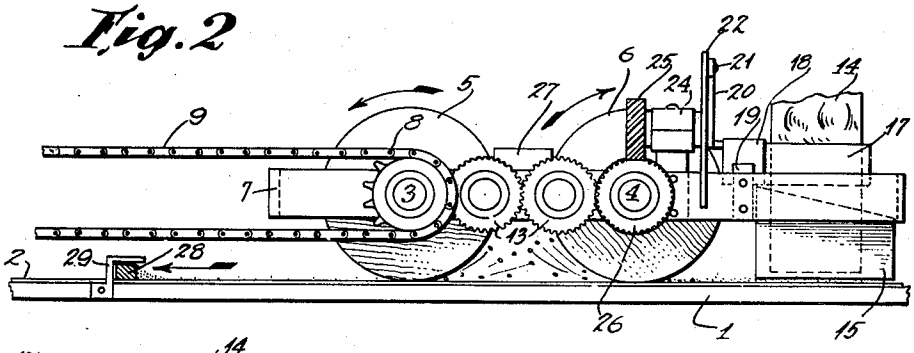
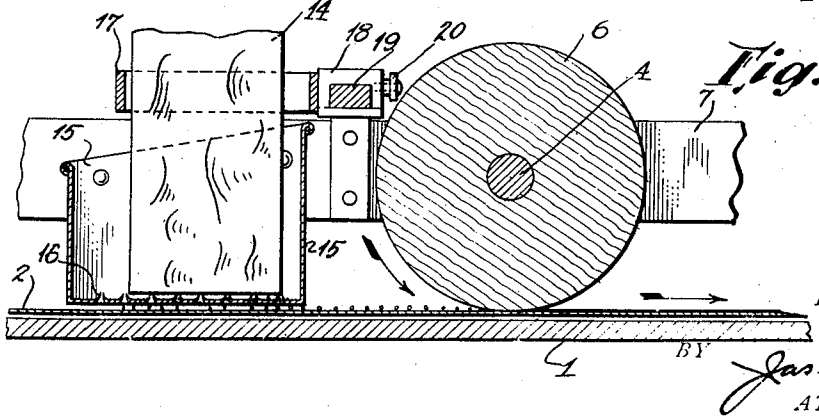


Fig. 3



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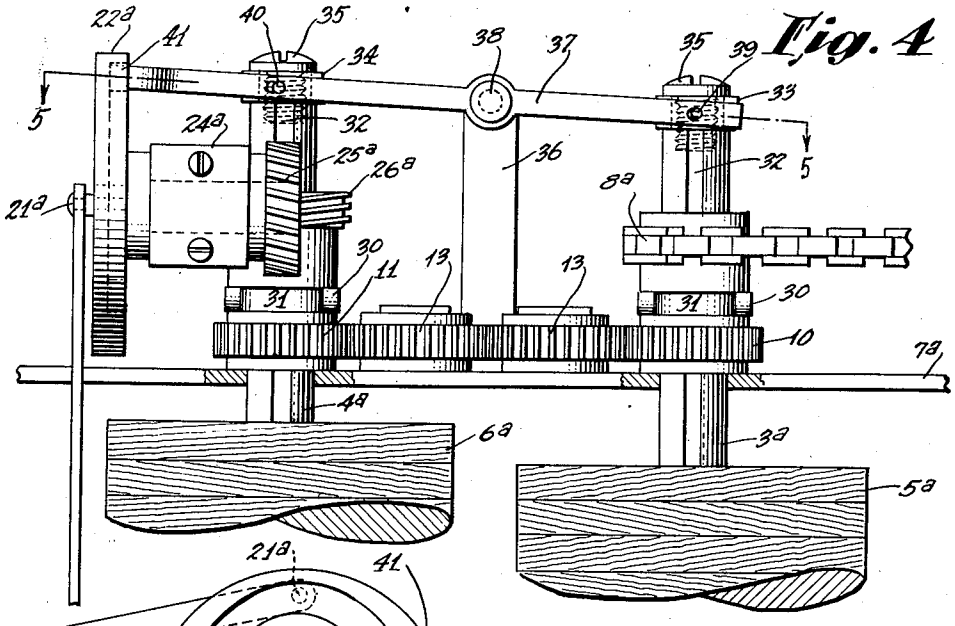


Fig. 4

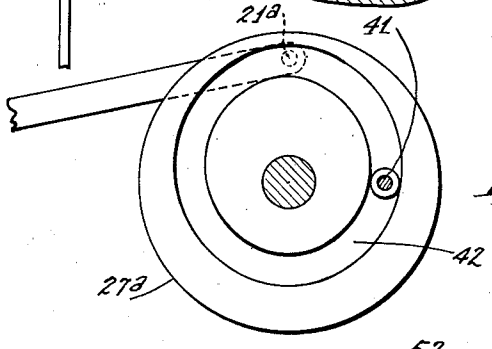


Fig. 6

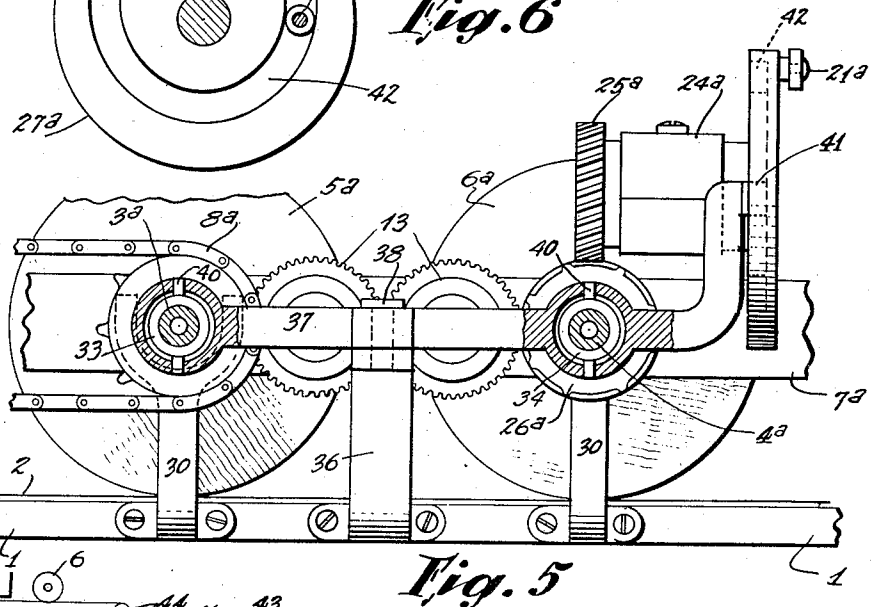


Fig. 5

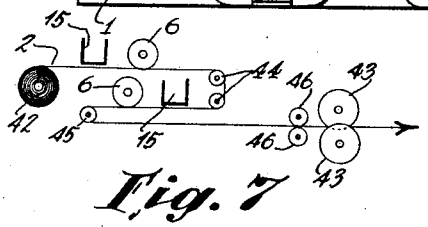


Fig. 7

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Patented Sept. 20, 1927. 1,643,117

UNITED STATES PATENT OFFICE.

CHARLES GUSTAVSON, OF BROOKLYN, NEW YORK, ASSIGNOR TO LION MATCH CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR APPLYING A LUBRICANT TO PAPER.

Application filed June 9, 1925. Serial No. 35,851.

This invention relates to apparatus for preparing paper or cardboard for cutting mechanism and especially relates to the preparation of strip cardboard for the cutting mechanism of book match making machines. In this art, it is the practice to feed a strip of cardboard or heavy paper to reciprocating or revolving cutters which divide the strip transversely into match widths, the strip being thereafter cut transversely and longitudinally to form it into combs.

It is well recognized that in the cutting of paper the knives or dies employed dull very rapidly and it is practically impossible to maintain sharp cutting edges which will efficiently operate upon the paper without very frequently re-sharpening the knives or dies. As a result of very exhaustive experimentation, I have found that paper or cardboard can be very efficiently and readily cut by dies or knives if such dies or knives are properly lubricated and I have discovered that the lubrication of the knives or dies can be efficiently provided for by coating the surface of the paper or cardboard with a relatively thin film of lubricant. For example, experience has shown that if a thin film of wax or paraffin is applied to the surface of the paper or cardboard, the paper stock can be cut much more readily and with less wear and tear on the cutters than could possibly be accomplished in the absence of such lubricant, and while not absolutely essential, it is desirable that the lubricant upon the paper stock be in the form of a relatively thin film which, in practice, may be applied either manually or through the employment of mechanical means provided for this purpose.

The object of the present invention therefore is to not only provide a method of preparing paper stock to be cut, but also consists in providing for the treatment of a strip of paper with a lubricant in a wholly automatic and mechanical manner and with a view to minimizing labor and the expense incident to manual application of the lubricant. While any suitable lubricant may be employed without departing from the spirit of this invention, paraffin will be particularly described in this connection, as illustrative.

The paraffin may, in practice, be deposited upon the moving strip of paper in advance of rubbing rolls and said paraffin is preferably deposited upon such strip in a finely divided condition. The apparatus of this invention may be constituted to receive and discharge the paraffin in such condition, but, in practice, is preferably constructed to reduce lumps or blocks of paraffin into such finely divided condition and deposit it in such condition upon the paper strip.

The movement of the strip in the direction of the cutting mechanism carries the paraffin into cooperation with one or more rubbing rolls, which operate in a manner to rub the paraffin into the paper and form upon the surface of such paper a relatively thin film of paraffin. From the rubbing rolls, the paper continues to travel to the knives or cutters, where it is operated upon in the usual manner in the manufacture of match combs.

In one of its practical commercial forms, the apparatus consists in a pair of rubbing rolls, operatively connected to one another and driven form the match forming machine to rotate in opposite directions and at speeds different from the speed at which the paper strip travels. The rolls are mounted to rest upon the surface of the strip, so that as the strip is drawn beneath the rolls, a rubbing action results. Positioned in advance of the rolls is a holder for one or more blocks of paraffin, which rest upon an uneven or abrasive surface adapted to function as a grater. The holder is operatively connected to the power train of the apparatus for the purpose of imparting movement to the paraffin over the grater which, in turn, is positioned directly above the surface of the moving strip, so that, as the blocks are moved, paraffin is grated therefrom and falls by gravity upon the paper strip in advance of the rubbing rolls in finely divided state. In this condition the paper is fed beneath the rubbing rolls, and the finely dividly paraffin is rubbed over the surface of the paper to produce the relatively thin film desired.

If desired the rubbing rolls may be mounted for rotary movement only, although a more thorough distribution of the paraffin over the surface of the paper is obtained if the rolls are shifted longitudinally while rotated. Thus the present invention contemplates both simple rotary movement and also combined rotary and longitudinally movement of the rolls.

Features of the invention, other than those specified, will be apparent from the herein-

after detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different mechanical practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a plan view of apparatus embodying the present invention.

Figure 2 is a side elevation of the apparatus shown in Figure 1, as viewed in the direction of the double arrow in the latter Figure.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a fragmental view similar to Figure 1, but showing a modified construction.

Figure 5 is a view corresponding to Figure 2, but illustrating, in elevation, the construction shown in Figure 4;

Figure 6 is a face view of the cam disk employed in the construction of Figures 4 and 5; and,

Figure 7 is a diagrammatic view.

Referring to the drawings. 1 designates a table leading to the cutting mechanism of a book match making machine and along which table a strip of paper or cardboard 2 is caused to pass. Any suitable means known to the art may be employed for moving the strip, but it should be moved positively and preferably independently of the lubricant applying apparatus which constitutes this invention.

Extending transversely above the table 1 are two shafts 3 and 4, on which are fixed rubbing rolls 5 and 6. These rolls may be of any suitable material, but, for the purpose of illustration are shown as built up from a plurality of wooden disks firmly secured to one another and fixed to the shafts. The two rolls are shown of the same diameter although they may be of different diameters in practice. The two shafts 3 and 4 are journalled for rotation in suitable bearings (not shown) on a frame 7, which is secured to the table or to the frame of the machine which carries the table in any suitable manner. In practice, the weight of the frame and parts associated with it may be carried by the shafts 3 and 4 and the shafts supported in turn by the rolls which bear upon the strip of paper 2, although, if desired, the frame 7 may be mounted rigidly with the shafts spring pressed to maintain the rolls in engagement with the paper strip. These are matters of detail to which the present invention is not limited. Suffice it to say that the rolls are mounted to rotate in engagement with the paper strip.

By reference to Figures 1 to 3, it will be noted that the shaft 3 is provided with a sprocket 8 about which a sprocket chain 9 is passed. This chain is driven from any suitable source of power, preferably from the match making machine with which the apparatus is associated, and through these connections the roll 5 is rotated.

In the construction of Figures 1 to 3, the shaft 3 has affixed thereon a gear 10 and on the shaft 4 is fixed a gear 11. Idlers 13 are mounted on the frame 7 and mesh with one another and with the gears 10 and 11, so that through the connections the rolls 5 and 6 are rotated in opposite directions, while in engagement with the strip 2, for the purpose of rubbing and distributing over the surface of the strip 2 lubricant previously deposited thereon. Lubricant may be applied in different ways, but, for the purpose of illustration, I have shown the source of lubricant as consisting in one or more blocks of paraffin 14. These blocks of paraffin rest upon the the bottom of a receptacle 15, which is rigidly supported upon the frame 7 in advance of the rolls 5 and 6. In the bottom of the receptacle is punched a large number of holes, the punching being accomplished from the exterior of the receptacle, so as to produce on the interior thereof upstanding bores 16 which, collectively, impart to the bottom of the receptacle the characteristics of a grater, as shown best in Figure 3.

The blocks of paraffin 14 rest upon the surface of this grater and are loosely encircled or embraced by a holder 17 supported on a slide 18 which is, in turn, mounted for reciprocating movement on a guide 19, which extends transversely of the apparatus and is anchored at its opposite ends to the sides of the frame. If the slide is reciprocated longitudinally of the guide 19, it will cause the blocks of paraffin 14 to be reciprocated over the grater-like surface of the receptacle 15, and will grate the paraffin and deposit the same in finely divided form upon the traveling strip 2, as shown in Figure 3.

The means for reciprocating the holder as described will be accomplished in different ways, but a very convenient form of mechanism is shown in Figures 1 and 2 of the drawings. In this showing, the slide is connected by means of a pitman 20 to a wrist pin 21 mounted off center of a disk 22. The disk is fixed to a shaft 23 mounted in a suitable bearing 24. The bearing is carried by the frame 7 and the opposite end of the shaft carries a worm wheel 25 which meshes with another worm wheel 26 fixed on the shaft 4, as shown best in Figure 2. As the shaft 4 is driven from the shaft 3 through the idlers 13, rotary movement is simultaneously imparted from the shaft 4 through the worm gears 26 and 25 to the shaft 23 which operates the wrist pin, and, through the pitman reciprocates the slide 19 and grates the paraffin blocks.

When the machine is in operation, the paper strip 2 travels over the table 1, receives the paraffin in finely divided form and carries it to the rolls 6 and 5 in succession, which, rotating in opposite directions rub the paraffin into the paper and form on the surface thereof the thin paraffin film which will efficiently and effectually provide for subsequent cutting of the paper.

A guard 27 is shown as positioned between the rollers to keep particles of paraffin from being thrown up by the rolls. Moreover, it will be noted from Figures 1 and 2 that a scraper 28 is positioned beyond the rolls and held by suitable stops 29, so as to bear upon the strip of paper as it passes to the cutting mechanism. This scraper will hold up or remove from the paper any loose particles of paraffin, so that the paper will be perfectly smooth as it is fed to the cutters.

In the construction of Figures 1 to 3, thus far described, the rolls simply rotate, but, in the construction of Figures 4 to 6, the rolls are adapted for an additional movement, i. e., reciprocation longitudinally of their axes during simultaneous rotation. To provide for this additional movement, which, in practice, is found to give a more efficient distribution of the paraffin, a slightly different construction for operating the rolls is of course required. Thus as shown in Figures 4 to 6, the shafts 3^a and 4^a, which carry the rolls 5^a and 6^a, are driven through gears 10 and 11 and intermediate idlers 13, but the gears 10 and 11 have a slidable key connection with the respective shafts, so that the shafts are mounted for sliding movement through the gears, while rotation is imparted to the respective rolls. The gears 10 and 11 are maintained against shifting longitudinally of their axes by yokes 30, which are secured to the table 1, as shown in Figure 5. The yokes are bifurcated at their upper ends and occupy annular channels 31 in the hubs of the respective gears. In Figure 4, the hubs of these gears are shown as relatively broad with the hub of the gear 10 serving also as the hub of the sprocket 8^a, while the hub of the gear 11 constitutes the hub of the worm 26^a. The shafts 3^a are provided with slots 32 and the cooperating hubs are provided with feathers which work in said slots, so that while the gears are locked against rotation on the shafts, said shafts are free for longitudinal movement during this operation.

Corresponding ends of both shafts are reduced to receive collars 33 and 34 and these collars are locked against withdrawal by screws 35, so as to mount the collars against movement longitudinally of the shafts, but to allow of rotation of the shafts within the collars. Extending laterally between the two shafts and mounted upon the frame 7^a is a bracket 36, to which is pivoted a rocker arm 37. 38 designates the pivot. One end of the rocker arm is pivotally connected to the collar 33, at 39, while at the opposite side of the pivot 38, the rocker arm is connected to the other collar 34 at 40. Beyond the pivot 40, the rocker arm is extended to terminate in a cam follower 41, which extends into and is adapted to follow a cam track 42, formed in the rear face of the disk 22^a, which corresponds to the disk 22 of Figure 1. The opposite face of this disk 22^a carries a wrist pin 21^a which corresponds in structure and function to the wrist pin 21.

It will of course be understood that the bearing 24^a corresponds to the bearing 24 and that the worm wheel 25^a corresponds to the worm wheel 25 and meshes with the worm 26^a, so that the grating of the paraffin is effected in substantially the same manner as described with reference to Figure 1.

It will be noted, however, that as the rolls are rotated through the gears 10 and 11 and the idlers 13, and the disk 22^a turned to effect the grating operation, there will be an accompanying operation which will effect longitudinal shifting of the rolls. That is to say, the rotation of the disk 22^a will present different portions of the cam track 42 to the follower 41, for the purpose of oscillating the rocker arm on its pivot 38. This oscillation of the rocker arm will manifestly impart movement to the shafts 3^a and 4^a, and shift the rubbing rolls longitudinally of their axes, while they are being rotated through the gearing connections.

As a result of these two distinct operations, a highly efficient distribution of the paraffin is effected and a uniform coating of the paper strip 2 with a filament of paraffin results. A part corresponding to the scraper 28 is not shown in Figures 4 or 5, but may be employed if desired.

It will be apparent from the foregoing detailed description of the mechanism shown in Figures 1 to 6, inclusive, that said mechanism is adapted to apply lubricant to a paper strip or web in an entirely automatic manner. In these figures, I have illustrated merely the mechanism for applying the lubricant, but it will of course be understood that this mechanism is used as a part of the complete mechanism in the match making art or in any other art where paper stock is cut.

For the purpose of illustration, I have shown in Figure 7 a diagrammatic lay-out of the operations through which the paper stock may be successively passed in accordance with this invention. In this showing, the strip or web of paper 2 is uncoiled from

a feed roll 42 and is passed successively into cooperation with the grater 15 and a rubbing roll 6. From the rubbing roll 6, the web may pass directly to feed rolls 46 and cutting mechanism 43, shown diagrammatically as a pair of coacting cutting rolls. Such an arrangement would cause the lubrication of one surface of the paper. In Figure 7, however, the web is shown as passed around two directional rolls 44 and into cooperation with a second set of lubricant applying elements 15 and 6, which apply the lubricant to the opposite side of the web, after which the web is passed over a directional roll 45 and thence to feed rolls 46 which feed the web to the cutting mechanism. It therefore appears that the web may be lubricated on either one or both sides and that it is fed by the feed rolls 46 to any suitable cutting mechanism, at which point the lubricant on the paper will facilitate the operations of the cutting mechanism.

It is within the purview of this invention to apply the lubricant to paper stock by hand, but as this is a laborious and time consuming task, the automatic machinery hereinbefore described is preferable in practice, as it not only provides for a rapid treatment of the paper, but also effects a more uniform treatment than could be obtained by hand.

In dealing with the present invention in the foregoing detailed description, the invention has been described as associated with match making machinery and functioning to prepare paper strip for cutting into match combs. It is to be understood, however, that the invention is not limited to this particular use. That is to say, the function of the apparatus is, broadly stated, to coat paper with a lubricant, so that it may be subsequently cut and it will therefore be understood that the apparatus may be employed to apply lubricant to paper for different purposes than for making matches. The invention therefore is manifestly commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In an apparatus for applying a lubricant to paper, the combination with means for causing a web to travel, a plurality of rolls positioned to contact with the web, means for depositing lubricant upon the web in advance of the rolls, and means for simultaneously rotating the rolls in an opposite direction and for shifting them longitudinally of their axes of rotation, while in engagement with the web for the purpose of rubbing and distributing the lubricant over the surface of the web.

2. In an apparatus for applying a lubricant to paper, the combination with means for causing a web to travel, a rubbing roll in contact with said web, a grater positioned in advance of the roll, and means for moving solid lubricant over the grater to deposit the comminuted lubricant upon the web and for simultaneously rotating the roll to rub the lubricant over the web.

3. In an apparatus for applying a lubricant to paper, the combination of means for causing a web to travel, a receptacle provided with a perforated interior grating surface mounted above the web in advance of the roll and adapted to support lubricant in solid form, a holder mounted for sliding movement transversely of the web and adapted to embrace the solid lubricant, and means for simultaneously rotating the roll and reciprocating the holder, whereby a solid lubricant is grated and deposited upon the web in comminuted form to be rubbed over the surface of the web by the roll.

4. In an apparatus for applying a lubricant to paper, the combination with means for causing a web to travel, a plurality of rubbing rolls bearing against the web, operative connections between said rolls for rotating them in different directions, comminuting mechanism positioned in advance of the rolls and connected for operation therewith, and means for driving the rolls and comminuting mechanism.

5. In an apparatus for applying a lubricant to paper, the combination with means for causing a web to travel, a plurality of rolls engaging with said web, a grater positioned in advance of the rolls and in engagement with which grater solid lubricant is normally maintained, means for effecting relative movement between the solid lubricant for the purpose of comminuting lubricant and depositing it upon the web, and means for simultaneously imparting rotation to the rolls and conjoint movement of the rolls longitudinally of their axes of rotation, whereby the lubricant is thoroughly rubbed and distributed over the surface of the web.

In testimony whereof I have signed the foregoing specification.

CHARLES GUSTAVSON.