Jan. 31, 1939. L. SCHARF 2,145,636

APPARATUS FOR MANUFACTURING TRANSPARENT CELLULOSIC TUBES

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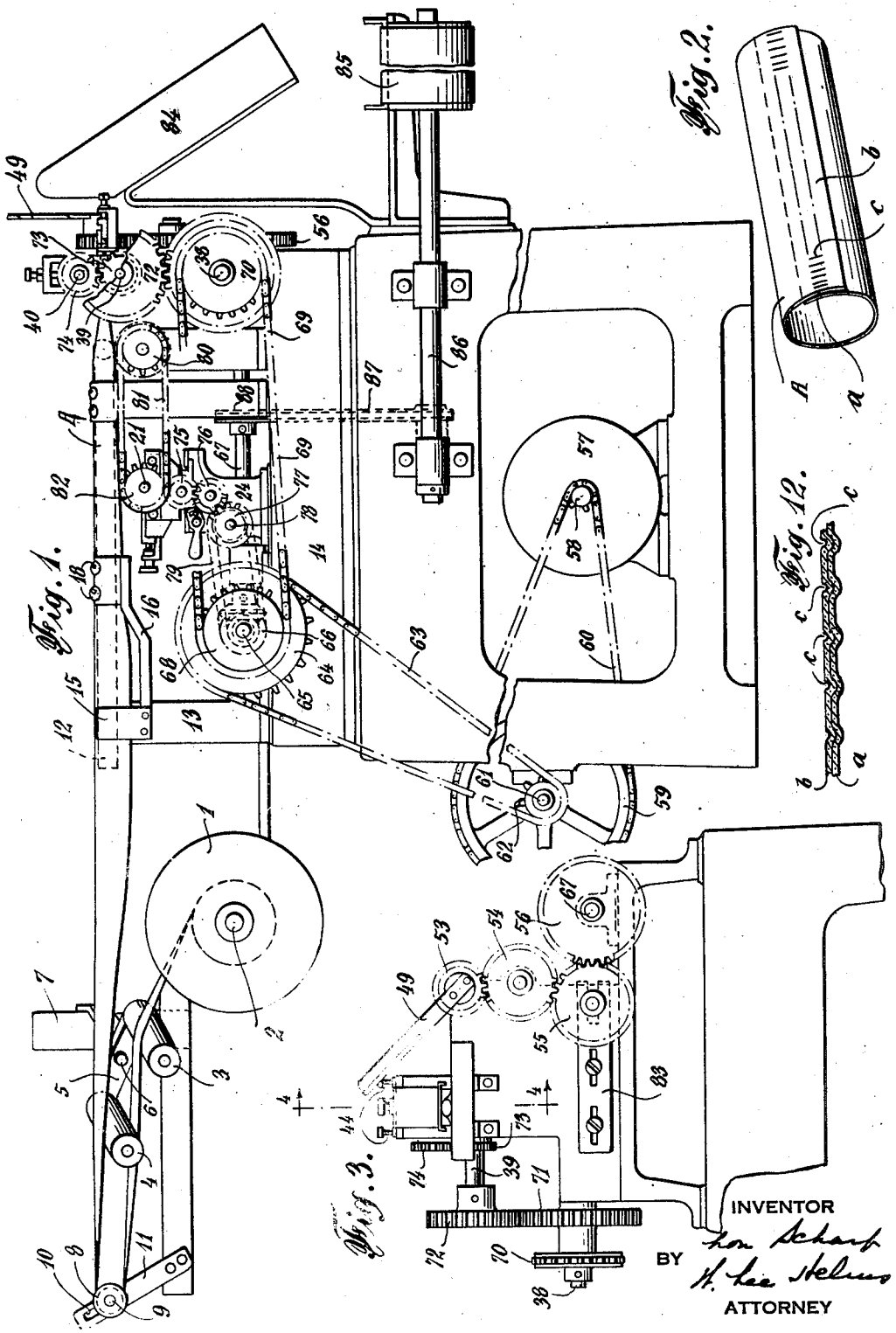


Fig. 1.

Fig. 2.

Fig. 12.

Fig. 3.

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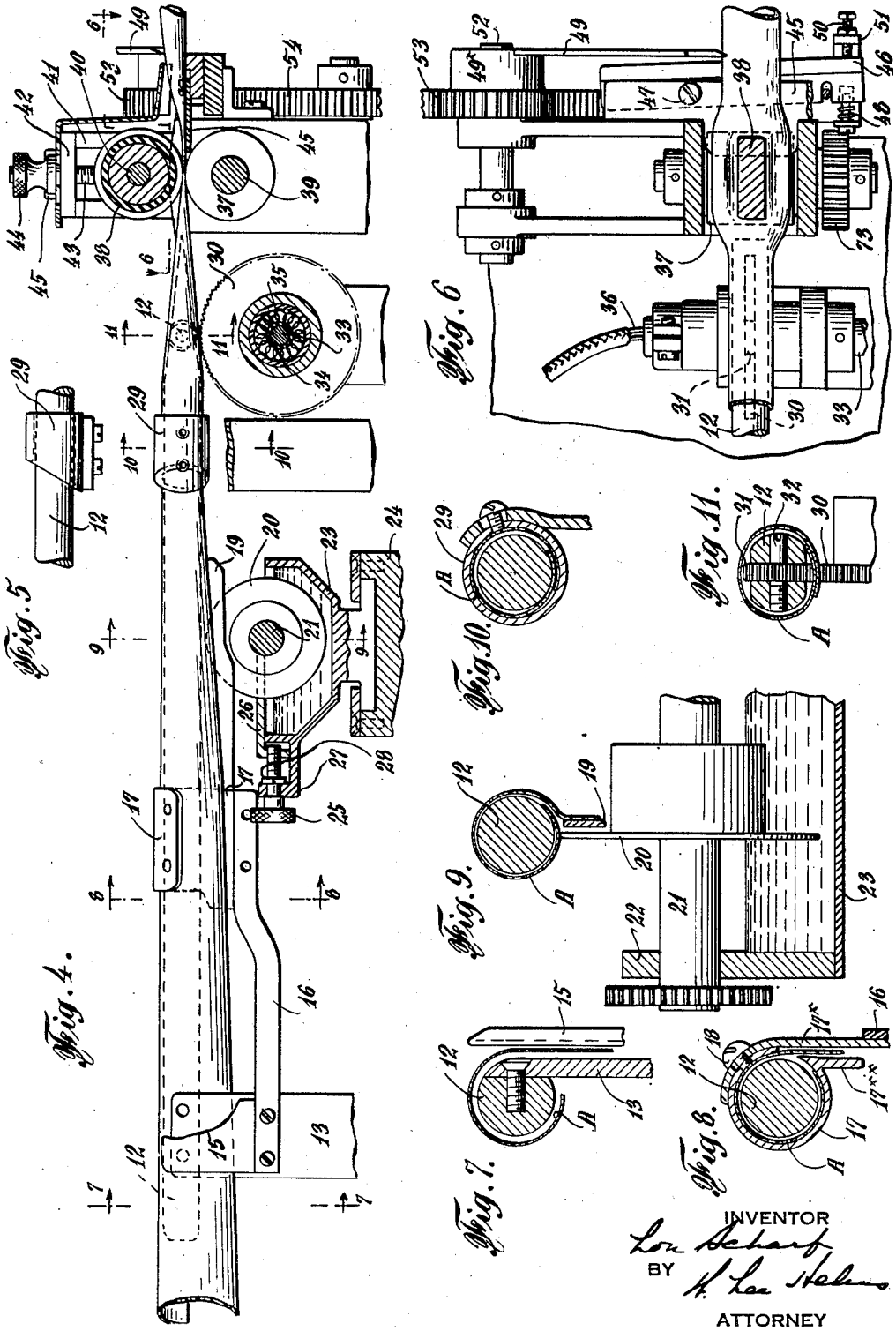


Fig. 4.

Fig. 5

Fig. 6

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

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APPARATUS FOR MANUFACTURING TRANSPARENT CELLULOSIC TUBES

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4 Claims. (Cl. 93—82)

The object of the present invention is to provide a tube of "Cellophane" adapted for enclosing cigars, candy, and other articles. Its characteristic is freedom from folds or creased lines and a true circular formation throughout, incorporating a strip with the side margins overlapped and united to form a substantially air-tight seam.

The invention will be described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of a machine adapted to the transparent cellulosic tube.

Figure 2 is a perspective view of a tube embodying the invention.

Figure 3 is an end view in rear elevation, diagrammatically showing the cutter mechanism and omitting the chute and cross feed for the finished tube.

Figure 4 is an enlarged view in partial section of the tube-forming elements, the curved plate 17 having been removed for clearness of illustration.

Figure 5 is a plan view of the final curling sleeve showing the core member therein, broken away at its ends.

Figure 6 is a horizontal section taken generally on the line 6—6, Figure 4.

Figure 7 is a vertical section on the line 7—7, Figure 4.

Figure 8 is a vertical section on the line 8—8, Figure 4.

Figure 9 is a vertical section on the line 9—9, Figure 4.

Figure 10 is a vertical section on the line 10—10, Figure 4.

Figure 11 is a vertical section on the line 11—11, Figure 4.

Figure 12 is a greatly enlarged longitudinal section through a portion of the overlapping margins of the strip in its completed tubular formation, showing the interlocking ribs and channels.

The strip of transparent cellulosic material is preferably fed from a roll of that material indicated at 1, Fig. 1. It is mounted on a horizontal shaft 2. The strip may be led into contact with supporting and tension rollers 3, 4, carried by an arm 5 pivoted at 6 to a bracket 7. The strip then passes over a roller 8 which may be carried by supporting shaft 9 movable within the slot at 10 of a bracket arm 11. The strip extends from roller 8 forwardly to the initial members of the tube-forming mechanism, a vertical section of which is shown in Fig. 7. These members consist of a core 12 carried by an arm 13 upwardly extending from horizontal frame member 14, and an alignment plate 15 slightly spaced from arm 13.

Plate 15 is carried by an arm 16 secured to the second tube forming element which consists of a sleeve 17 receiving screws 18 which pass through elongated holes in a curved plate 17x resting upon said sleeve 17 and immediately carrying arm 16 which supports plate 15.

The sleeve 17 is split adjacent curved plate 17x and at a depending portion thereof which is straight, said depending portion being slightly spaced from a guiding extension 17xx of sleeve 17.

Through the action of plate 17x and guiding extension 17xx of sleeve 17, one margin of the strip is maintained spaced from the opposed margin of the strip, the latter being curved around the core 12; and a guide finger 19 carried by member 17xx maintains the first-named margin in vertical position spaced from the opposed marginal area of the strip until the latter is engaged by the periphery of a rotating adhesive applicator wheel 20.

Wheel 20 is carried by a shaft 21 mounted in suitable bearing members, one of said bearing members being shown at 22, Fig. 9, the base wall of the box being indicated at 23. The adhesive box 23 is adjustable in the key channel of the bracket member 24 (Fig. 4) carried by frame member 14, said adjustment being longitudinally of shaft 21. An adhesive scraper 26 for shaft 21 adjustable toward and from the shaft is provided with an adjusting screw 25 threaded within an aperture formed in the depending end of the said scraper 26. Adjustment screw 25 is held against endwise movement by a collar 28 abutting an outer vertical wall of bracket arm 27 (Fig. 4). The scraper is adapted to engage the side of adhesive wheel 20.

After receiving the adhesive at one margin thereof, the now almost completely formed tube is received within forming sleeve 29 which causes the margin held away from the major cylindrical form of the strip to be brought around in superposed relation to the margin receiving the adhesive.

Forwardly of the forming sleeve 29 is a lower heated roller 30 which co-acts with a small knurled or serrated roller 31 rotating between the opposed walls of a vertical slot formed in the core 12. Roller 31 is directly received upon a bearing stud 32. Roller 30 is insulated from the shaft 33 by which it is rotated, by means of a tube 34 of insulating material. A heating coil 35 within the hub of the roller transmits heat by conduction to the metal surface of the roller. The coil is connected to the feed wires 36, Fig. 6.

The action of the small knurled roller within the formed tube of transparent cellulosic material with the co-acting pressure and heat of roller 30 insures a strong adhesive bond between the overlapped margins of the strip material and causes a substantial drying of the adhesive. The tube then passes over a lower relatively wide feed roller 37 and under a relatively narrow feed roller 38, these rollers being positively driven and causing a feed of the unformed strip connected to the completed tube and feeding of the tube to a cutting knife by means of which tube sections of a desired size are severed. Roller 37 is carried by shaft 39 and roller 38 is carried by shaft 40 which may be mounted in bearing blocks (not shown). Each block may be carried in a slideway such as that afforded by the parallel guiding walls 41 surmounted by a wall 42 having a threaded aperture receiving a screw 43 adapted to be moved endwise by thumb wheel 44 (the latter being held against endwise movement by clips 45), in order that pressure may be applied to roller 38.

In the action of the rollers 37, 38, the tube is not creased because roller 38 as shown in the plan view, Fig. 6, contacts with the longitudinal center only of the tube. The tube in passing beyond the rollers 37, 38, rests on a plate 45 and thence passes over a lower yielding shear member 46 which is pivoted at 47 on plate 45. A spring 48 tends to move shear member 46 toward a bodily rotatable shear member 49, the extent of that movement being regulated by an adjusting screw 50 carried by a bracket arm 51. The hub 49x is carried by a shaft 52 on which is fixed a pinion 53 in mesh with a gear 54 driven by intermeshing gears 55, 56.

The primary drive of the apparatus is obtained from the motor 57, the motor driven sprocket wheel 58 being connected to a reduction sprocket wheel 59 by chain 60. Sprocket wheel 59 is mounted on a shaft 61 carrying a sprocket 62 connected by chain 63 with sprocket wheel 64 on shaft 65.

Shaft 65 is connected by double gears 66 with the shaft 67 which extends to the front of the machine and carries gear 56, thus providing a drive for the shear. Shaft 65 carries a sprocket wheel 68 connected by chain 69 with a sprocket wheel 70 on shaft 38.

In the rotation of shaft 38 a gear wheel 71 carried thereby drives gear wheel 72, Figs. 1 and 3. Gear wheel 72 is on shaft 39 which carries feed roller 37. Shaft 39 carries a small pinion 73 in mesh with the pinion 74 on shaft 40 which carries the upper feed roller.

The adhesive wheel 20 mounted on shaft 21 is rotated through the instrumentality of a gear on shaft 21 in mesh with a pinion 75 in mesh with a second pinion 76 driven by gear wheel 77 on shaft 78 which is driven in any suitable manner, as, for example, from shaft 68 by a chain drive 79 (Fig. 1).

Shaft 33 carrying the heated wheel 30 carries a sprocket wheel 80 conected by a chain 81 with a sprocket wheel 82 on driven shaft 21 (Fig. 1). Gear wheel 55 in the knife actuating train of gears is carried by an adjustable sub-frame member 83 so that by changing the ratio of gears 55 and 56 the timing of the shear element 49 may be varied in order to produce tubes of various lengths.

The tubes as they are severed fall upon a chute 84 and are directed by the latter upon a transversely extending feed belt 85 mounted upon two pulleys, one only being shown in Fig. 1. Each pulley is carried by a shaft such as shaft 86 and one shaft, that back of shaft 86 in Fig. 1, and hence obscured by the latter, may be driven by a belt 87 led from a pulley 88 on driven shaft 67. Belt 85 is continuously driven and will carry the severed tube members away from chute 84 and to a discharge point where they may be discharged into a suitable container.

By handling the strip in the manner described, light weight transparent cellulosic material may be formed into tubes having a strong airtight joint, with high-speed operation of the apparatus. The use of feed belts or similar carriers for the strip is avoided, and the strip is fed to the forming mechanism by actuation of the finished tube in such manner that the latter is not deformed. In fact, the feeding mechanism assists the formation of the firm bond of the overlapped margins of the strip comprising the completed tube.

In some cases the positively driven roller 30 acting upon the exterior of the tube in coaction with the roller 12 acting upon the interior surface of the tube, will be sufficient to feed the tube and the unformed strip behind it. I prefer, however, to supplement this feeding action by means of additional feed members such as the rollers 37 and 38.

Referring to Figs. 2 and 12, it will be seen that the tube A is formed of a strip, the margin *a* being superposed by the overlying margin *b*. By the action of the serrated or toothed rollers 12 and 30, a series of downwardly extending ribs indicated at *c* is formed in margin *b*, these ribs entering channels formed in underlying margin *a*, along the line of adhesive.

Each completed unit being open at its ends and unflattened, may immediately be used for receiving articles such as cigars, candy, toothbrushes, etc., and the ends twisted, folded or cemented to form end closures. Even when very light cellulosic material is employed, it has been found that the tubes may be packed in containers such as cardboard containers with their longitudinal axes horizontal, and several thousand of the tubes in a single container, so that many are superposed, without affecting the shape of the tubes when removed for use.

Having described my invention, what I claim and desire to secure by Letters Patent, is as follows:—

1. In a machine for forming tubes from a strip of transparent cellulosic material, a core member, a forming sleeve surmounting the core member and adapted to curl a portion of the strip, including one margin, around the core member, means associated with the forming sleeve for holding the second margin of the strip separated from the curled area thereof and comprising a blade lying under the core member, slightly spaced therefrom, and extending longitudinally thereof, means for applying a longitudinally extending line of adhesive to the curled margin of the strip and comprising a chamber for liquid adhesive and a rotary disk therein, the disk being positioned adjacent the said blade and its upper peripheral area being positioned for contact with the curled portion of a strip on the core member, means for laying the second margin upon the curled margin bearing the adhesive, thereby forming a tubular structure, feeding means including a rotary element carried by the core and acting upon the interior of the tubular structure, and a co-acting rotary member

exterior to the tube and acting upon its exterior surface.

2. In a machine for forming tubes from a strip of transparent cellulosic material, a core member, an initial forming sleeve surmounting the core member and adapted to curl a portion of the strip, including one margin, around the core member, opposed plates adapted to hold the second margin of the strip separated from the curled area thereof, a rotary adhesive wheel disposed adjacent the core member and said plates for applying adhesive to said curled margin of the strip, a second forming sleeve surmounting the core member and adapted to lay the second margin of the strip upon the curled margin bearing the adhesive, thereby forming a tubular structure, and feeding means for the strip comprising opposed rollers acting upon the exterior of the tubular structure, one of said rollers being of less thickness than the diameter of the tubular structure and the second roller being of greater thickness than the diameter of the tubular structure.

3. In a machine for forming tubes from a strip of transparent cellulosic material, means for supporting a roll of said material, a core member, a forming sleeve surmounting the core member and adapted to curl the strip into tubular formation, means for applying adhesive to one margin of the strip, tension means for the strip between said roll supporting means and the core member, feeding means for the strip including feed rollers acting upon the completed tube, means for severing tube sections, and heating means for the tube in advance of said severing means including a rotary member bearing upon the exterior of the tubular structure, and a rotary member carried by the core and bearing upon the interior of the tubular structure to press the latter against the first-named rotary member.

4. A machine for forming tubes from a strip of transparent cellulosic material constructed in accordance with claim 3, in which the heat applying rollers are adapted to form interfitting channels and ribs in the lapped margins of the strip composing the tube.

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