May 24, 1960 CARL-OTTO WAGNER 2,937,591

ROTARY EMBOSSING DEVICE FOR ENDLESS PRINTED TAPES

Filed Dec. 5, 1955 3 Sheets-Sheet 1

Fig. 1

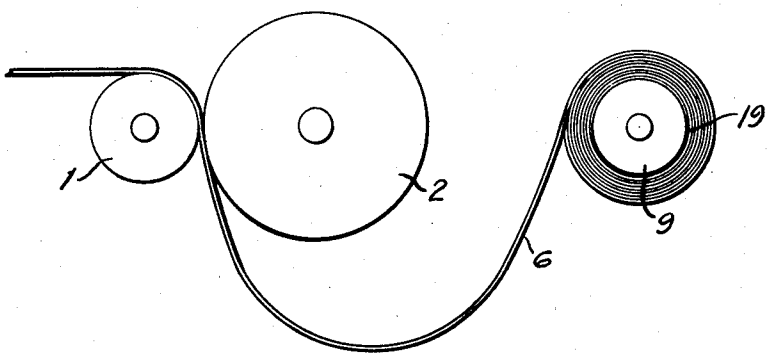
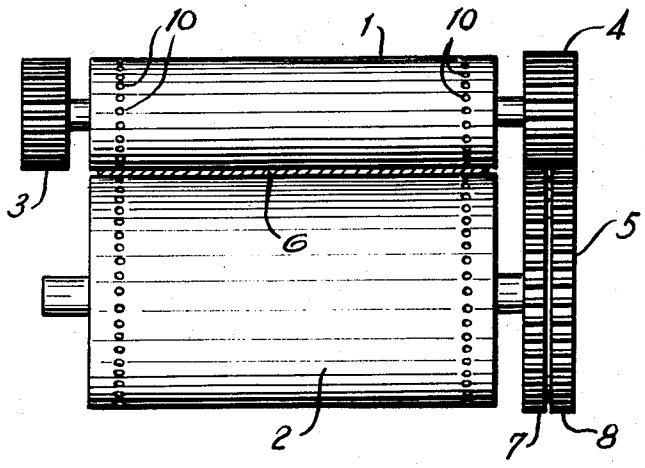


Fig. 2



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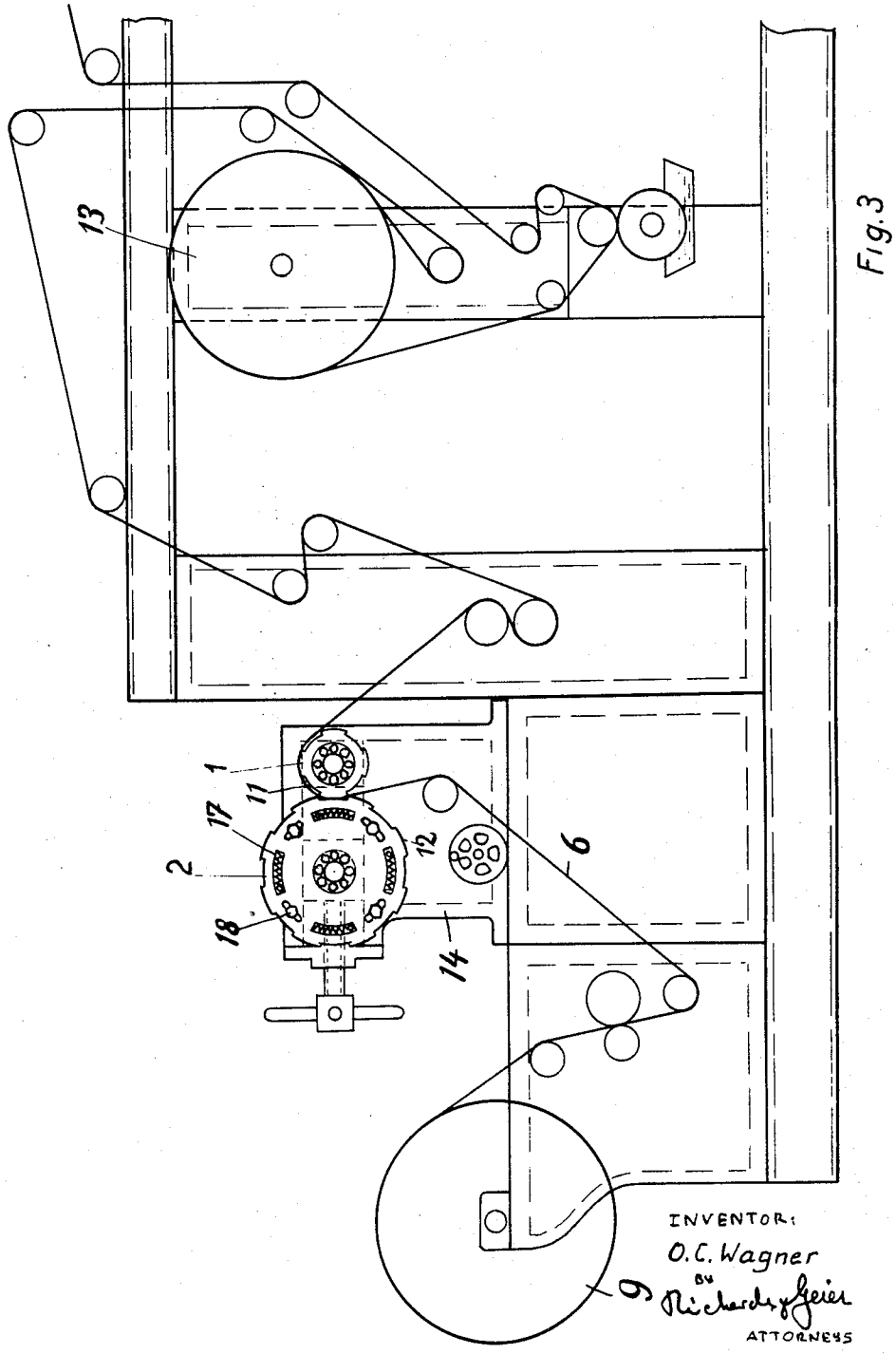

Fig. 3

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Fig. 4

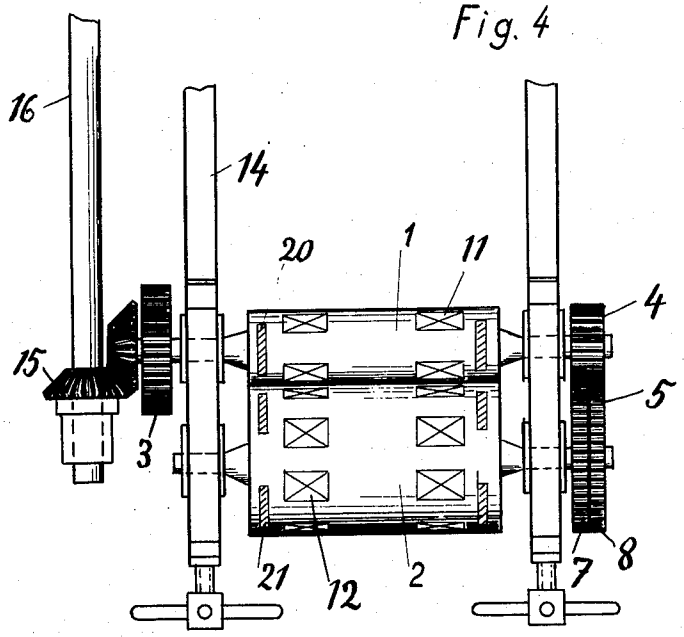
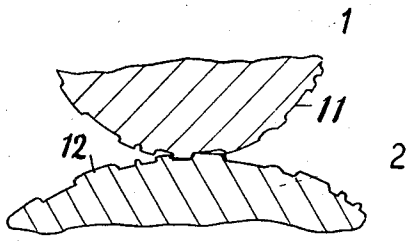


Fig. 5



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ROTARY EMBOSSING DEVICE FOR ENDLESS PRINTED TAPES

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5 Claims. (Cl. 101—23)

This invention relates to an embossing device which is combined with a rotary printing machine and constructed to emboss a rotary printed endless tape, which is intended to be used for manufacturing of packages of various goods, such as chocolates and similar products.

One object of the invention is to have the tape printed and embossed in one single and continuous operation of the embossing device.

Another object of the invention is to provide a rotary embossing device, in which the printed tape is embossed at certain precise spots of the print, and in which damages of the tape by too vital operation of the embossing device are avoided.

Another object of the invention is to provide means at the rotary embossing device, which are adapted to wind up the printed and embossed tape to facilitate further processing of the tape in a packing machine located directly behind the embossing device.

Another object of the invention is to avoid flattening of the embossment of the printed tape when it is wound up after the embossing process.

Other objects and advantages of the invention will appear hereinafter in connection with the following description of an embodiment of the invention as illustrated in the accompanying drawing, which shall be regarded part of this specification and in which:

Figure 1 is a side section of the embossing device in a simplified representation, and

Figure 2 is a front view on the embossing device.

Figure 3 is a side view of the complete device with the end member of a poly-cylindrical rotary deep printing machine.

Figure 4 is a front view of the embossing device with its drive.

Figure 5 is a partial section through the two embossing rollers.

The embossing device, which is formed of the respective matrix and punch cylinders 1 and 2, is placed at the end of a multi-cylinder low bed rotary printing machine 13 and mounted together with this machine on a shelf 14, which is shown in part in the drawing. The surface of the matrix cylinder 1 carries the impression image 11, while the punch cylinder 2 is provided with the corresponding relief image 12. By means of a toothed gearing 3 and the cone gear drive 15, the matrix cylinder 1 is connected wth the main driving shaft 16, which extends through the whole length of the printing machine, while a gear wheel 4 is mounted at the control-side end portion of a shaft of the matrix cylinder 1 to gear with a gear wheel 5 mounted at the control-side end portion of a shaft of the punch cylinder 2.

The transmission mechanism which is composed of the gear wheels 4 and 5 may be provided with a transmission ratio of 1:2, and the matrix cylinder 1 may have a diameter of, for instance, 440 mm. The diameter of the punch cylinder 2 by a few millimeters exceeds the length which would correspond to the ratio of the transmission mechanism. Referring to the above

example of a transmission ratio of 1:2 and a diameter of the matrix cylinder 1 of 440 mm., the diameter of the punch cylinder 2 should be 882 mm. By this measure the peripheral speed of the punch cylinder 2 will exceed, to a certain extent, the peripheral speed of the matrix cylinder 1. In consequence of this construction, the printed paper tape 6, approaching to the cylinders 1 and 2 from the rotary printing machine 13, is more vitally driven into the embossing mould 11 of the matrix cylinder 1, due to the more rapid rotation of the punch cylinder 2. By this measure one further achieves an accurate embossment without damaging the paper tape. The overlength of the diameter of the punch cylinder 2 should be provided in correspondence with the approximate depth of the embossing mould 11 imbedded in the circumference of the matrix cylinder 1. To continue the aforementioned example these moulds may show maximum depths of 1 mm.

To ensure a precise adjustment of the embossing cylinders to those spots of the printed paper tape 6, which are intended for embossment, the gear wheel 5, which is located at the control-side end portion of the punch cylinder 2, is axially divided into two parts 7 and 8, the part 7 of the gear wheel 5 being rigidly mounted on the shaft end of said punch cylinder and the part 8 being mounted on the shaft end to have a certain tangential resiliency by means of the springs 17 which are located in corresponding tangential grooves of the gear wheel 8. The resilient gear wheel part 8 will compensate the play of the tooth profiles between the rigid gear wheel part 7 and the gear wheel 4 of the matrix cylinder 1, so that the punch cylinder 2 will rotate without tangential sliding against the matrix cylinder 1 with the result that the embossment is continuously and exactly stamped into the paper tape at the spots provided for. After adjustment of the matrix cylinder 1 the resilient gear wheel part 8 is locked against the rigid gear wheel part 7 by screws 18.

When the paper tape 6 has passed the embossing device it is wound up on a drum cylinder 9, which is located behind the embossing device and driven by friction force only, so that no strain is effective on the paper tape 6. The drum cylinder 9 is provided with a felt coat 19 to avoid flattening of the completed embossment of the paper tape when it is wound up on the drum.

To achieve a more improved protection against flattening of the printed and embossed paper tape, being wound up on the drum 9, the paper tape may receive an auxiliary embossment 10 at both its side margins, which may consist of one or several rows of stamped out points, or of other, similar profiles 20, 21. These marginal impressions cause the impressions of the individual layers of the impressed tape which are wound one upon the other, not to lie directly one upon the other, the impressions being protected against flattening in that the tape lies upon these marginal profiles and thus the middle portion of the tape containing the impression is provided with a free intermediate space in the individual layers.

The embossing operation according to the invention may also be provided before the paper is printed in the rotary printing machine, in which case the embossing cylinders, being connected with the drive of the rotary printing machine, are located before the printing machine.

The novel features of the device according to the invention are regarded in admitting, for the first time, to perform embossments with the rotary method directly before of after the printing operation and to achieve a precise working of the embossing mechanism according to the rotary method. The device according to the invention renders possible a continuous rotary embossing

and printing operation in mutual dependence, which is of advantage particularly for manufacturing stamped or embossed packages from endless tapes, which may consist of paper or other materials, for instance plastic materials. In applying the device according to the invention, the packing machine processing the embossed tape may be fed with this tape directly from the drum cylinder, which direct feeding has been possible so far with unstamped or unembossed tapes only.

It is to be understood that the spirit of the invention may not be limited to the specific embodiment described herebefore in this specification, and that various other embodiments and characteristics of the invention may be employed within the full scope of my claims, which are:

1. A rotary embossing device for endless printed tapes, comprising an impressing machine consisting of a matrix cylinder carrying a recessed image impression and a punch cylinder carrying a projecting image impression; a transmission connected with one side of said matrix cylinder for driving said matrix cylinder, a gear wheel located upon the other side of said matrix cylinder and connected therewith, a gear wheel firmly connected with said punch cylinder and meshing with the first-mentioned gear wheel, a gear wheel resiliently connected with said punch cylinder and meshing with the first-mentioned gear wheel, means blocking the third-mentioned gear wheel relatively to the second-mentioned gear wheel, and means for winding the embossed tape.

2. A rotary embossing device for endless printed tapes, comprising an impressing machine consisting of a matrix cylinder carrying a recessed image impression and a punch cylinder carrying a projecting image impression; a transmission connected with one side of said matrix cylinder for driving said matrix cylinder, a gear wheel located upon the other side of said matrix cylinder and connected therewith, a gear wheel firmly connected with said punch cylinder and meshing with the first-mentioned gear wheel, a gear wheel resiliently connected with said punch cylinder and meshing with the first-mentioned gear wheel and a drum cylinder for winding the embossed tape, said drum cylinder being located close to the impressing machine to cause the embossed tape to hang loosely and without tension between the impressing machine and the drum cylinder.

3. A device in accordance with claim 2, wherein the punch cylinder has a somewhat greater circumferential speed than the matrix cylinder.

4. A device in accordance with claim 2, wherein the diameter of the punch cylinder is somewhat larger than the transmission ratio of the first- and second-mentioned gear wheels.

5. A device in accordance with claim 4, wherein the diameter of the punch cylinder is larger than the transmission ratio of the first- and second-mentioned gear wheels to the extent of the depth of the recessed image impression of the matrix cylinder.

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