APPARATUS FOR MANUFACTURING CORRUGATED INSERTS, ADAPTED TO BE USED IN BOXES

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The subject of the present invention is a method of manufacturing corrugated inserts, for example for the reception of articles which are easily broken, such as boxes for ampoules, and a machine for carrying this process into effect. Usually such inserts are formed from a corrugated part and a flat portion secured thereto, an ampoule being disposed in each valley in the corrugations. In a known machine the corrugations are formed between two toothed wheels which are inter-engaged. This method of manufacture is, however, not wholly satisfactory, since it is not easy to free the corrugated part from the wheels, and subsequent application of the flat portion requires special steps for maintaining the corrugations. The present invention aims at avoiding this drawback.

The process according to the invention consists in placing a flat strip of material, for example cardboard, over parallel rods which are advantageously round and are arranged in spaced fashion and pressing the same between these rods by means of slidable members. By this means a corrugated strip is obtained to which a flat strip of material is subsequently gummed.

A machine for carrying out this process has frames in which are arranged spaced parallel rods, and means for passing these frames, advantageously in stepwise fashion, through the machine. Provided in this latter are slidable members which are movable transversely to the plane of the frames, which members are for example operable in a controlled movement by means of a cam shaft.

The process, and a preferred embodiment of the machine for carrying it out, will now be explained with reference to the accompanying drawings. These show:

Figure 1 a longitudinal section through the machine,
Figure 2 an end view,
Figure 3 a plan,
Figure 4 a longitudinal section through the frame for forming the corrugations,
Figure 5 a transverse section on the line V—V of Figure 4,
Figure 6 diagrammatically the manner of operation of the machine,
Figure 7 a perspective view of an insert according to the invention.

The machine illustrated in the drawings has a base plate 1 to which are secured two side walls, 2, 3. Arranged on both side walls 2, 3 is a motor 4. Arranged around a pulley 5 mounted on the motor shaft is a belt 6 which passes over a belt 7. Rigidly connected to the pulley 7 is a pulley 8 which is designed to drive a pulley 10 through a belt 9. The pulley 10 is rigidly mounted on a shaft 11 which is rigidly connected to eccentric discs 12—15. On the discs 12—15 bear the respective end of a lever 16 or 18. These levers are pivotally mounted on a shaft 19 and carry at their other ends in each case a slidable member 20, 21, or 22 respectively. These members 20—22 are mounted in guides 23 for vertical sliding movement. Beneath the guides 23 are two guide rods 24 secured in the side walls 2 and 3. Bearing on the eccentric 12 in each case is a roller 25 of a double armed lever 27, which latter is oscillatable between the walls 2 and 3. The free ends of the two levers 27 are linked to a carrier 28 which is permanently pivoted into its end position by a spring 29. A pawl 30 is connected to each of the two sides of the carrier, these pawls each projecting externally upwards beyond the plate 1 and sliding along a guideway 31. These pawls 30 co-operate with pins 32 which are secured to a frame 33. The frame 33 is constituted by two longitudinal bars 34 and cross-pars 35. The bars 35, as is subsequently explained in more detail, are arranged at a predetermined distance from one another.

The machine operates as follows:

In order to produce the inserts, a comparatively long strip of cardboard is placed on the rods 35 of the frame 33, the foremost end of this strip 36 being pushed under the front rod (Figure 4). The frame 33 is, as shown by Figure 1, then placed on the base plate 1 and pushed in the direction of the arrow beneath the guide rods 24, until the first two pins 32 are engaged by the pawls 30. Rotation of the shaft 11, which is continuously effected by the motor 4, causes the cans 12a of the discs 12 to reciprocate the levers 27 in such fashion that the carrier 28, and therewith the pawls 30, are moved against the action of the spring 29. In so doing, the pawls 30 pull the frame 33 a distance between the walls 2 and 3 necessary for the next operation. It is clearly apparent from the drawing that the levers 16 to 18 are pivoted by the cans 13a, 14a and 15a in such manner that first the slide 20, then the slide 21, and subsequently the slide 23, are moved downwards. The frame 33 is located in such a position that the plate 20a secured to the slide 20 slides exactly between two rods 35. The strip 36 is carried forward by this action and a wave is produced therein. After the slide 20 has reached its lowestmost position, the slide 21 moves downwards and produces a second wave. Dur-
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ing the period that the slide 20 is moving upwards, the slide 22 is depressed and thereby produces a third wave. The position of the cams 12a, 13a, 14a is such that the two slides 21 also move upwards and thus free the frame 32. At the moment that the cam 14a and the paw 33 are again controlled by the disc 12 in such fashion that the frame is further advanced in the direction of the arrow by a distance corresponding to the rods. Subsequently to this the cams 13a, 14a and the paw 33 mounted on the frame 20 and 22 downwards, as described above, and the next three corrugations in the strip 35 are produced. This procedure continues until the whole frame is advanced past the slides 20, 22 and the complete band 36 is formed into corrugations.

By means of the following frame 35c (Fig. 6), the frame 33 is moved further. It slides under a pressing roller 40, on which a strip 41, made of cardboard or the like and provided on one side with adhesive, is guided. This strip is unwound from a stock roll 42 and led over rollers 43, 44. All rollers are rotatably supported in a stand 46, and through this stand the strip 41 slides and is then provided on one side with adhesive. The roller 40 presses strip 41 on to strip 35c, thus forming these two parts firmly together. In the frame 45 a cutting appliance 48 is provided; this is controlled in such a way that it sever the adhesive strip 41 at the end of the corrugated strip 35. Subsequently, the strip thus obtained need only be cut to the desired length in order that inserts as illustrated in Fig. 7 may be formed and then laid in a box known per se for taking ampoules or other breakable objects.

Preferably, the roller 40 is vertically displaceable in the stand 46 and is at both ends under the action of a spring 49, these springs acting in addition to the dead-weight of the roller 40, so as to press strip 41 on to strip 35c. When strip 41 has been cut, a free part of it becomes formed under the roller 40 and sets itself somewhat downwards. However, as soon as the foremost bar 35 of the frame 35c is moved under the roller 40, this roller presses the free end of the strip 41 on to the bar 35. In this way, with the progressive movement of the frame 33a, the strip 41 is carried along and stuck on to the corrugations of the strip 35c in the manner already described.

The inserts described need not be only of cardboard, but may also be of synthetic materials, metal, woven fabrics, asbestos, or combinations of any suchlike materials. The pieces 41a projecting out beyond the strip 35 (Fig. 7) may, as shown by the broken lines, be folded over the corrugations of strip 35 in a suitable manner. What we claim is:

1. A machine for producing corrugated inserts for receiving and spacing breakable articles, comprising a base, a frame movable on said base, said frame including spaced parallel rods having a cross section the same as that of the articles, said frame receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods for holding said members in said spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.

2. A machine for the manufacture of corrugated inserts for boxes, comprising a base, a frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, parallel guides between which said slideable members are positioned, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.

3. A machine for the manufacture of corrugated inserts for boxes, comprising a base, a frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.

4. A machine for the manufacture of corrugated inserts for boxes, comprising a base, a frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.

5. A machine for the manufacture of corrugated inserts for boxes, comprising a base, a frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.

6. A machine for the manufacture of corrugated inserts for boxes, comprising a base, a frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.

7. A machine for the manufacture of corrugated inserts for boxes, comprising a base, a frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable transversely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, and means for intermittently moving said frame along said base when all of said members have been moved into said spaces and removed therefrom.
of said lever, and means carried by said carriage arranged to engage said frame when actuated by said cam and said lever, said cam being so shaped and so positioned on said cam shaft as to actu-
ate said lever and said carriage when all of said members have been moved into said spaces and removed therefrom to cause said means to en-
gage said frame to move said frame along said base a predetermined distance.

6. A machine for the manufacture of corru-
gated inserts for boxes, comprising a base, a
frame including spaced parallel rods movable along said base, said rods receiving a sheet of material from which inserts are to be formed, a plurality of slideable members movable trans-
versely of said base into the spaces between said rods, means for moving said slideable members individually into the spaces between said rods and for holding said members in the spaces until an adjacent member has been moved into an adjacent space, means for intermittently mov-
ing said frame along said base when all of said members have been moved into said spaces and removed therefrom, both said means continuously repeating their movements upon completion of the movements individually accomplished by each of said means, and means
for applying an adhesive coated strip of material to the now corrugated strip over the rods to main-
tain the corrugations in the strip of material, a plurality of frames being fed manually to said machine and said second named means inter-
mittently moving each of said frames along said base whereby a following frame moves a preced-
ing frame past the means for applying the adhe-
sive strip.

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