

Nov. 30, 1954

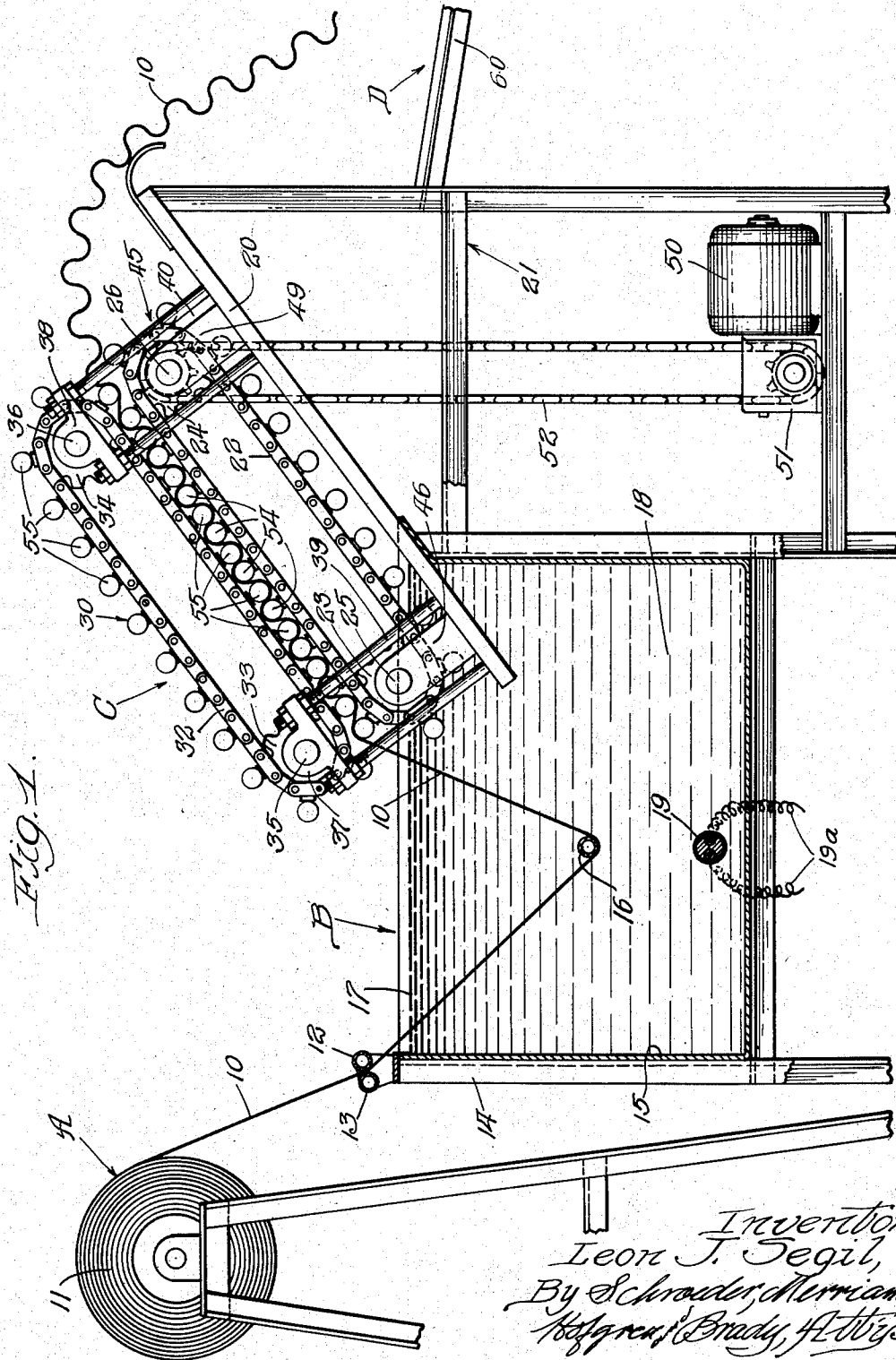
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TREATING AND CORRUGATING UNIT FOR STRIP MATERIAL

Filed Jan. 27, 1951

2 Sheets-Sheet 1



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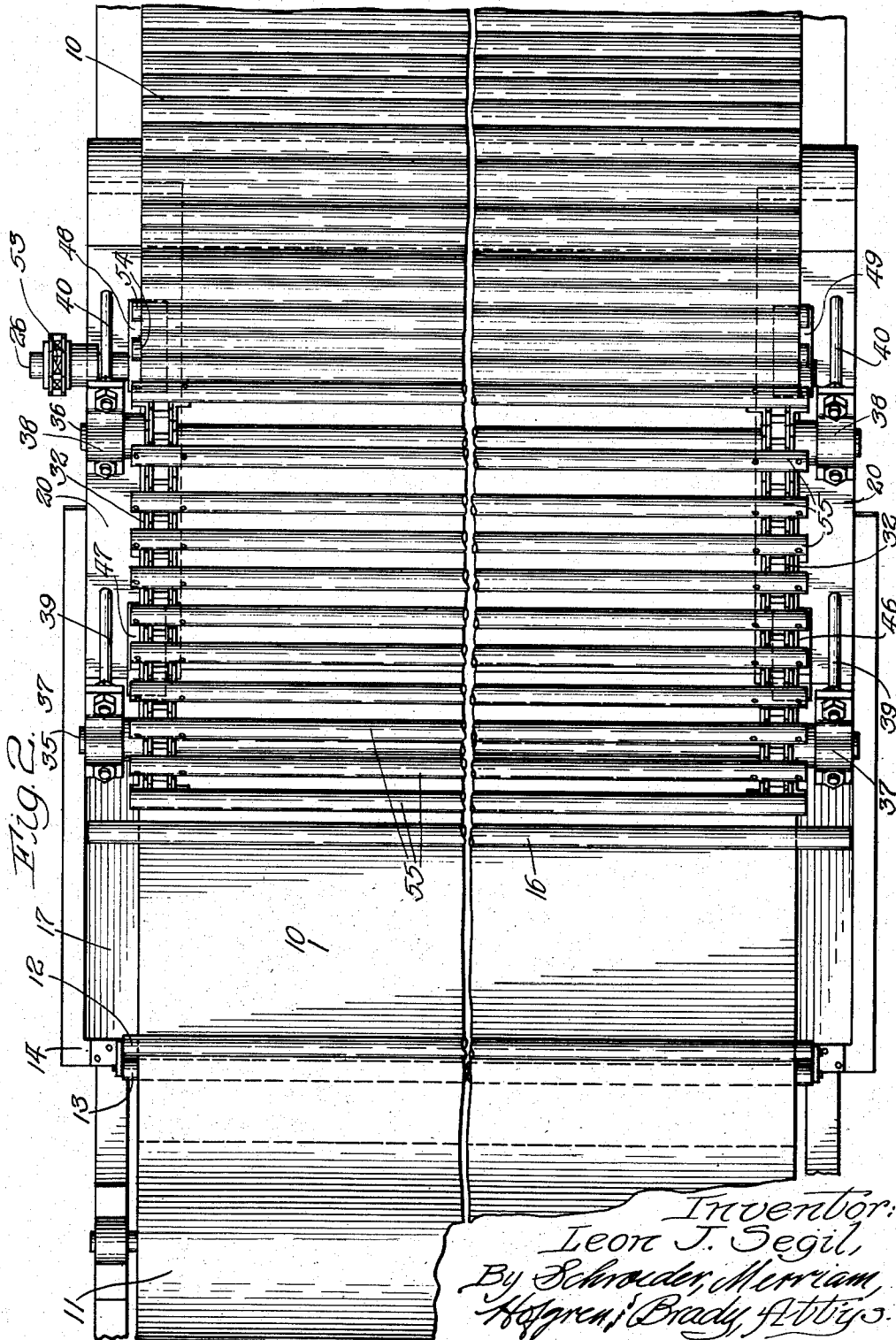
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TREATING AND CORRUGATING UNIT FOR STRIP MATERIAL

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Application January 27, 1951, Serial No. 208,217

3 Claims. (Cl. 154—30)

This invention relates to apparatus for treating and shaping strips of relatively thin material and more particularly to such apparatus for treating and corrugating plastic material in continuous lengths.

Translucent plastic material in thin sheets or lengths has been found useful in providing a diffused, shadowless illumination for habitable rooms. One ceiling structure using such material is illustrated and described in my copending application, Serial No. 198,404, filed November 30, 1950.

The primary object of this invention is to provide an effective and simple apparatus for treating and corrugating a continuous length or a strip of thin material.

Another object is the provision of corrugating apparatus of the character described which will form corrugations in the material passed through it and maintain each formation until the material is discharged from the apparatus and will retain the shape imparted to it.

A further object is the provision of apparatus of the character described which will impart a slight camber extending in a lateral direction with reference to the material at the same time that the corrugations are formed in the material.

A further object is the provision of apparatus in compact form and in which a continuous length of material may be held in longitudinal tension while passing through a treating stage and a shaping or forming stage.

Further objects and advantages of the invention will be apparent from the following description given with reference to an exemplary embodiment illustrated in the drawings, in which:

Fig. 1 is a fragmentary side elevation, partly in section, of one embodiment of the invention.

Fig. 2 is a fragmentary plan view of the apparatus shown in Fig. 1.

In general, the apparatus by which a plastic strip 10 is treated and formed is illustrated in Fig. 1, in which a roll A of material in strip form is led first to a treating bath B from which it passes to a corrugating stage C and from there continues in its given shape to a drying stage D. The whole apparatus is generally supported upon a framework in turn mounted on the floor of a building or the like. It is intended that the plastic strip 10 be treated and formed in a continuous operation with the drying stage being performed immediately following the forming stage, or, if desired, the drying stage be removed to a separate location in a particular installation of the apparatus.

The plastic strip material 10 may be secured in various widths and in the particular embodiment shown is approximately 36 inches wide. The strip 10 is led from the roll 11 to a pair of opposed rollers 12 and 13 having their axes parallel and their peripheries in contact with each other. These rollers are mounted on the upper edge of the framework 14 supporting a liquid bath tank 15. The strip 10 is threaded between the rollers 12, 13 and the rollers are provided with reasonably tight fitting end bearings so that tension is placed on the strip 10 between these rollers and a second idle roller 16 secured within the tank 15 below the liquid level 17 in the tank.

The liquid 18 in the bath is a water soluble wax including a wetting agent and a neutralizing agent. The bath is maintained at approximately 150–180° F. by means of a heating element 19 having electrical leads 19a controlled by a thermostat (not shown). As the plastic strip 10 is conducted into the heated bath liquid 18 it is

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coated on both sides with a thin coating of wax which serves to give the plastic strip a protective coat and also destaticizes the sheet.

From the liquid bath, the strip 10 is led directly to the corrugating stage C. The corrugating apparatus is mounted on a pair of base plates 20 secured to a framework 21 supported in turn on the floor of a room or the like. The plates 20 are inclined to slope toward the treating bath. The lower end of the set 45 of rods is normally immersed in the bath liquid 18 so that the material 10 may be received in the corrugating stage with very little travel of the strip between the surface 17 of the liquid and the corrugating rolls.

The corrugating stage consists of two sets of opposed rods arranged to mesh along part of their travel with the strip 10 interleaved between the meshing rods. The two sets of rods, generally designated 30 and 45, are identical in structural details. Each set of rods comprises a pair of endless chains mounted upon sprocket wheels keyed to shafts supported in end bearings held in position by rods extending upwardly from the base plates 20.

As seen in Fig. 1, the lower set 45 of rods has individual rods 54 secured at the ends thereof to endless chains 22 movable in caterpillar fashion on sprocket wheels 23 and 24. The wheels 23 and 24 are respectively keyed to shafts 25 and 26. Bearings 46 and 47, shown in dotted lines in Fig. 2, support shaft 25 and similar bearings 48 and 49 support shaft 26. The individual rods 54 of the lower set are securely fastened to alternate links of the endless chains 22.

The upper set of rods 30, has endless chain supports 32 movable in caterpillar fashion on sprocket wheels 33 and 34. The sprocket wheels are keyed to shafts 35 and 36 respectively, as in the manner of the lower set. The individual rods 55 of the upper set are also fastened to the endless chain supports 32.

As viewed in Fig. 2, the shafts, 35 and 36, are journaled in end bearings 37 and 38 secured to the base plate 20 by means of rods 39 and 40. The bearings of the lower set of rods are placed inside the bearings of the upper set of rods. In this manner, the sprocket wheels supporting the endless chains 22 and 32 of each set of rods may be placed in a plane perpendicular to the supporting base plate 20 and the individual rods of each set may travel in similar paths.

The depth of corrugations formed by the individual rods 54 and 55 of the opposed sheets may be regulated by moving one or the other of the supporting bearings of one set of rods relative to the base plate 20. Threaded nuts are provided on the rods supporting each set so that movement relative to the base plate 20 may be easily accomplished.

An electric motor 50 provided with a reduction gearing 51 is connected by a continuous chain 52 to a drive wheel 53 keyed to the shaft 26 of the lower set 45 of rods. The entire drive of the corrugating unit is thus accomplished through a direct drive of the lower set of rods 45 and the meshing of the individual rods of the lower set with the individual rods of the upper set 30. Thus, as seen in Fig. 1, individual rods 54 of the lower set 45 are spaced closely against individual rods 55 of the upper set to drive the latter. The strip 10 of material is interleaved between the meshing rods 54 and 55. Since the material leaves the liquid bath of the treating stage B at approximately 170°, it is quite soft and may easily be interleaved between the corrugating rods. At the beginning of the travel of the strip through the corrugating stage the rods form the corrugation and maintain that corrugation for the entire travel of the strip through the corrugating cooling stage, since the individual rods 54 and 55 maintain their relative position for the entire length of travel.

It has been discovered that a slight transverse camber may be imparted to the corrugated strip by placing tension on the strip before it enters the corrugating stage C. It is believed that the particular mounting of the corrugating rods also contributes to the slight lateral or transverse camber imparted to the material. In a specific embodiment of this invention, the rods 54 and 55 were slightly longer than the width of the material treated

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and were supported only at their ends without any support between the ends other than the rods themselves. This permits some slight bending of the rods 54 and 55 between their points of support. The camber in the material is slight, perhaps equal to one-half inch of deviation in the center of the strip relative to a plane passed through the center of the longitudinal edges of the strip after it is corrugated. This is advantageous in that the strip later may be supported in a ceiling structure only at its longitudinal edges with the weight of the strip providing sufficient deflection in the center thereof to make the strip lie flat.

As best seen in Fig. 1, the strip 10 passes from the corrugating stage C in its corrugated shape. While the strip has been somewhat dried in passing through the stage C, additional drying may be desired. A long table 60 adjacent the stage C may be provided for receiving the corrugated strip material or drying ovens may be positioned in the drying stage D to receive the strip 10 directly from the stage C. Ordinarily the corrugated strips are rolled for drying or shipment to the place of use. In order to preserve the corrugations substantially in the shape in which they are formed, small flat strips of the material may be laid upon the corrugated strip prior to its being rolled, in order to space the corrugated convolutions in the roll.

While I have shown and described one embodiment of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims.

I claim:

1. In a treating and corrugating unit for continuous lengths of translucent plastic material in widths for illuminating ceiling panels, including, a treating stage having a tank containing a heated liquid wax bath and tensioning rollers yieldably guiding the material through the wax bath against the pull of the corrugating unit; a corrugating stage comprising: cooperating units having relatively wide treads adapted to engage the material as it emerges from the wax bath and move said material longitudinally in a path between the treads, said treads each having a plurality of parallel elongated round rods each having a length greater than the width of the plastic material, said rods being mounted in spaced relation upon endless tracks and meshing along substantially the entire path of the material through the corrugating stage and each rod being supported only at its extremities so as to retain ability to flex intermediate its ends; and motor means for directly driving one of said cooperating units to travel said rods forwardly in said path with the

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plastic material caught between the meshing rods intermediate their ends to produce a camber in the corrugated material emerging from the treads, the other of said units being driven by interengagement with the rods of said driven unit.

2. A treating and corrugating unit as specified in claim 1, in which a pair of opposed rollers are provided in the path of the material leading to the wax bath, said rollers having their axes parallel and a portion of their surfaces in rolling contact one with the other, said material being passed between said rollers and pulled toward the corrugating stage by said meshing treads and said rollers yieldingly restraining the material against said pull to provide longitudinal tension on the material between said rollers and said corrugating stage.

3. Apparatus for corrugating continuous lengths of translucent plastic material in widths adapted for use in illuminating ceiling panels, comprising: a base frame; a pair of cooperating units having relatively wide treads adapted to engage and longitudinally move said material in a path therebetween against yielding resistance placing tension in the material; each of said treads including spaced parallel round rods each attached only at their respective ends to a pair of endless tracks supported by the base frame in position to move the rods along said path, each rod having a length greater than the width of the material to be corrugated so as to extend beyond the longitudinal edges of the material when in said path and being of a size adapted to flex intermediate its ends under the pressure of tension in the material resisting formation of the corrugations, said rods being meshed not substantially more than their respective diameters and remaining meshed along substantially the whole distance of travel of the material through the apparatus; and motor means for driving said units to corrugate plastic material fed along said path and to place transverse camber in the material.

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