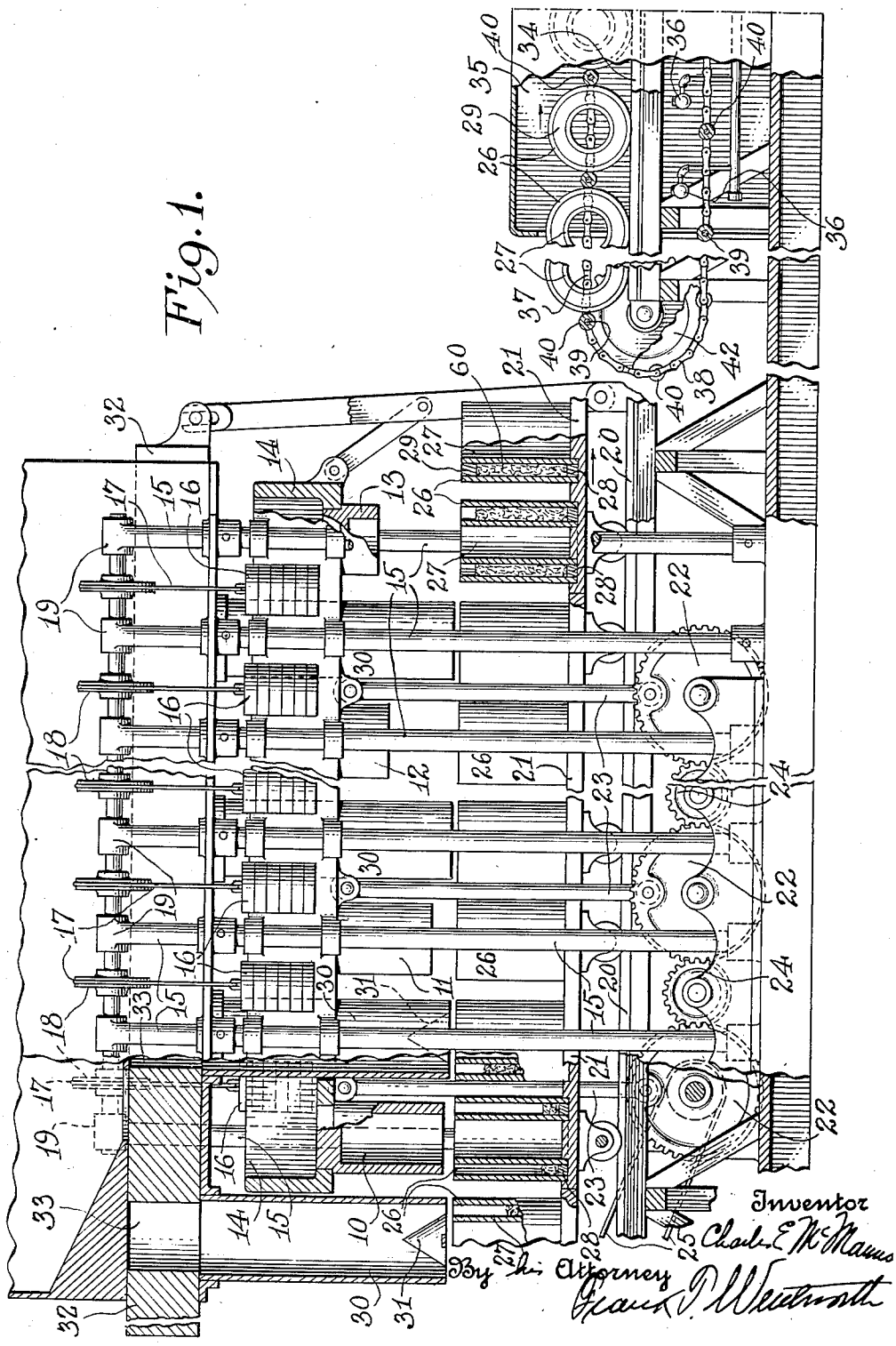
Dec. 22, 1925. 1,566,904

C. E. McMANUS

METHOD OF AND APPARATUS FOR MAKING COMPOSITION CORK SHEETS

Filed June 27, 1923 2 Sheets-Sheet 1

Fig. 1.



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METHOD OF AND APPARATUS FOR MAKING COMPOSITION CORK SHEETS

Filed June 27, 1923 2 Sheets-Sheet 2

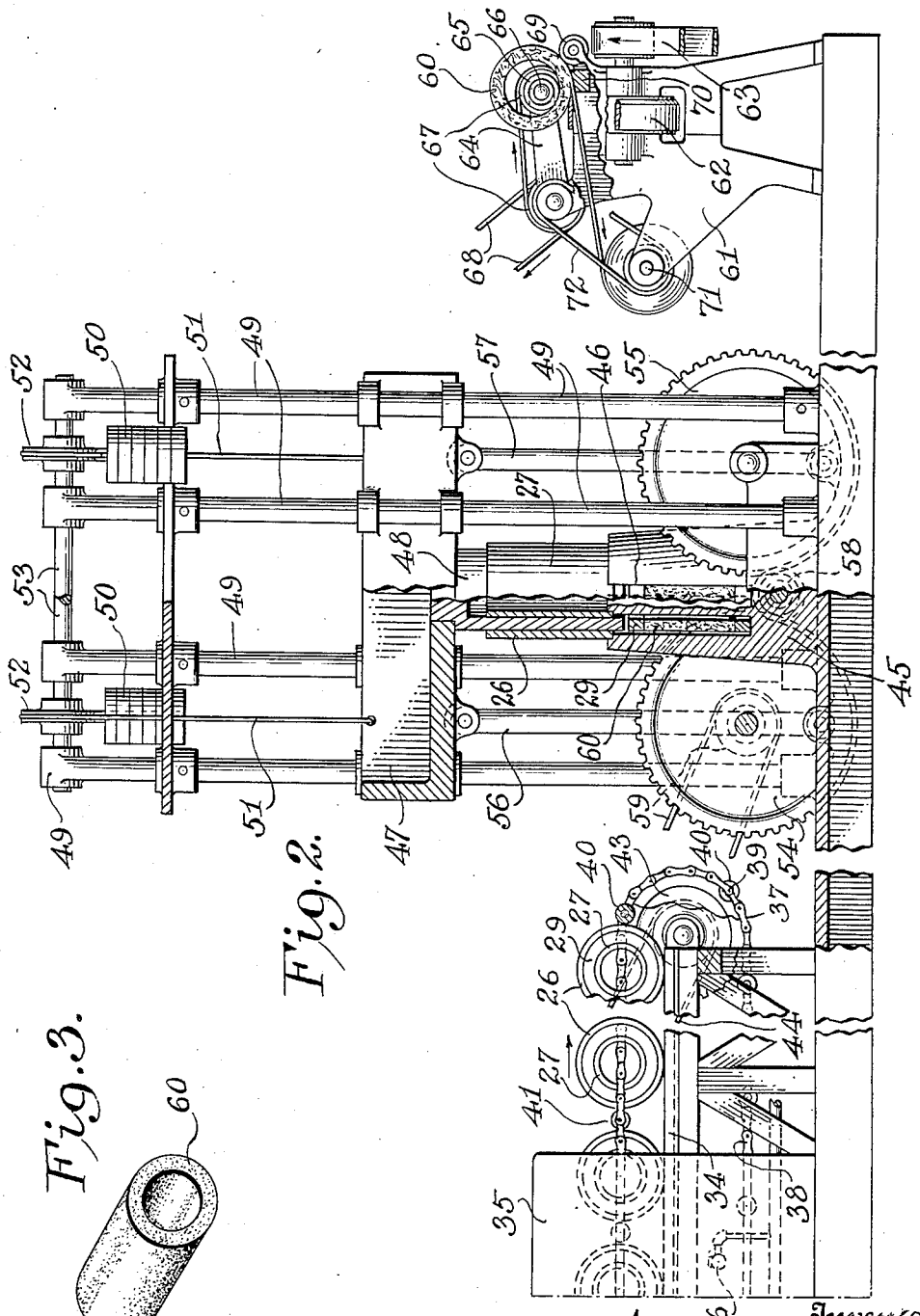


Fig. 2.

Fig. 3.



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Patented Dec. 22, 1925. 1,566,904

# UNITED STATES PATENT OFFICE.

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## METHOD OF AND APPARATUS FOR MAKING COMPOSITION CORK SHEETS.

Application filed June 27, 1923. Serial No. 648,111.

*To all whom it may concern:*

Be it known that I, CHARLES E. McMANUS, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in the Methods of and Apparatus for Making Composition Cork Sheets, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to a method of making composition cork sheets of any desired width and thickness, and of indefinite length, these sheets being of materially larger dimensions than is possible to obtain from the natural cork, and being produced under conditions which will ensure substantial uniformity in the thickness of the sheets; and to certain combinations and associations of mechanisms for producing these sheets from granulated cork, the granules of which have a thin coating of a suitable adhesive or binder.

Heretofore it has been my practice in making sheets of this character, to either form composition cork slabs and subsequently slice them by means of an ordinary slicing machine; or a continuous strip of the cork composition may be made and sliced in the same manner as said slabs, after cutting such strips in convenient lengths for handling upon the slicing machine. Composition cork sheets thus formd and formed by the method of my present invention, have the advantage that they are substantially free of surface imperfections and openings extending entirely therethrough which are found in the natural cork and vary as to the number and size of same, with the age of the natural cork. While this advantage in composition cork is generally recognized, such a product has the disadvantage that the methods employed in producing same, and the embodiment of an adhesive or binder, and its application to the cork granules as well as the mechanical handling of the materials, introduce factors of expense which require the employment of great economy in the various stages of the production of the composition cork in order to meet competition with the natural product.

By the practice of the method of my present invention, I am enabled to produce thin sheets of the composition cork without the employment of a backing strip or laminated structure for securing strips or sheets of the desired length to permit the economic production of other articles therefrom, it being possible by this method to form sheets of considerable length and to roll such sheets upon a mandrel so as to facilitate the subsequent handling of the product in sheet form and permit such handling to be economically done.

In the practice of the method of my invention, it is necessary to form the composition cork body from which the continuous sheets are cut or sliced, in tubular form for the two-fold purpose of securing sufficient volume or bulk of the composition cork to permit the production of sheets of the desired length, and to secure this bulk as a result of a fairly large diameter of the cork composition tube thus formed without increasing the thickness of this tube to that beyond which the entire mass of composition cork can be heated throughout in a manner to secure the effective and proper conditioning of the adhesive or binder employed for uniting the granules of cork, and a proper cooling for imparting a finel set to this adhesive or binder.

The method of my invention also involves the filling of annular mold spaces of the desired thickness with the granular cork and its adhesive or binder as stated above, in succeeding charges; the compaction of each charge of the mass within the mold space; the conveying of the cylindrical molds through an oven in which it will be successively subjected to an elevated temperature and to a relatively lower temperature, so as to first make the adhesive or binder active, and under some conditions to partially set same, and to complete the setting of the adhesive at a relatively low temperature; the ejection of the tubular mass from the mold and the final slicing of the tubular product as a result of a continuous rotary movement of the composition cork tube with relation to a suitable cutting blade which is continuously operative upon the material.

The apparatus of my invention includes mechanisms for compacting composition cork in the annular mold spaces of various molds, an oven containing conveyor means by which the fully charged molds are progressively passed through a heated chamber, and a chamber maintained at a relatively lower temperature, and an ejector mechanism associated with said other mechanisms

for forcing the cured composition cork tube from the mold, thus producing a tube of composition cork which may be readily mounted upon a slicing machine by which a sheet of uniform thickness may be produced from the composition cork tube, which machine will compensate for irregularities in the thickness of the wall of the tube, or other irregularities of the tube due to variable expansion or contraction of the mass of composition cork in different tubes.

The invention consists primarily in the method of making composition cork sheets consisting in compacting granular cork and a binder within an annular mold space, subjecting the mold and its contents to the action of heat to make the binder active, cooling the composition cork while within the annular mold space, drawing the tubular product from the mold space, imparting circular movement to the tubular product in relation to a cutting edge and exerting continuing pressure upon said tubular product toward said cutting edge, whereby it will be helically cut to produce a continuous strip of composition cork; and in the novel combination of mechanisms all as hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a side view partly in section, showing one end of an apparatus used in the method of my invention;

Fig. 2 is a similar view at the other end of said apparatus, both Figs. 1 and 2 being broken away and condensed; and

Fig. 3 is a perspective view of the tubular product.

Like numerals refer to like parts throughout the several views.

In the practice of the method of my invention, I form a tube of composition cork consisting of granules of cork provided with a thin coating of a suitable adhesive or binder. This tube may be of any desired length and is formed by introducing succeeding charges of the coated, granular cork to within a suitable mold and compacting each charge after its delivery to the mold. The thickness of the wall of the tube may vary from one to two inches, so that the volume of the compacted cork composition is reduced to an extent which will permit heat to readily penetrate the entire mass within a mold, for a sufficient interval of time to properly condition the adhesive or binder, without likelihood of injury to the cork composition as a result of a prolonged subjection of same to the action of an elevated temperature.

As each mold is completely filled with the compacted cork composition, the space left at the top of the mold as a result of the last compacting operation, is filled with a suitable closure plug, and the mold, with its contents, is passed through a baker or vulcanizer maintained at the desired elevated temperature. The time during which the contents of the mold is subjected to the elevated temperature within the baker or vulcanizer is such as to properly condition the adhesive or binder, and may vary according to the character of adhesive or binder used.

The subjection of the composition cork to the elevated temperature will result in a tendency of the mass of composition cork to expand, which tendency will result in a readjustment of the cork granules with relation to each other and the development of such pressure as will result in a more uniform compaction of the entire mass of composition cork and substantially uniform density in the product.

To facilitate the drawing of the tube of cork composition from the mold, and to complete the setting of the adhesive or binder, the mold and its contents after leaving the high temperature zone, is passed through a zone of relatively lower temperature to permit the cooling of the mold, and of at least the portion of its contents adjacent the wall thereof, before the body is drawn from the mold.

After leaving the low temperature zone, the mold is brought into the desired relation to an ejecting mechanism by which the tube is forced, longitudinally of the mold, from within the mold space. The superficial cooling of said tube, and the slight shrinkage of the mass due to the cooling action while within the low temperature zone, will relieve the frictional resistance between the inner and outer surfaces of the tube and the mold wall, and facilitate this ejecting operation.

After the composition cork tube, properly bonded and cured, has been drawn from the mold, it is cut into a continuous strip of the desired thickness by rotating the tube with relation to a suitable cutting edge, thus taking a helical cut from the tube, the continuity of the cutting action resulting from the rotation of the tube about its axis and its movement radially of its axis of rotation, and toward the cutting edge as a result of the constantly diminishing diameter of said tube as the strip is cut from the outer edge thereof.

The resulting product is a continuous composition cork strip of substantially uniform thickness and of a length which will be determined by the diameter of the tube and the thickness of the wall thereof. This strip will be of substantially uniform density throughout, free from superficial or other voids, and may be readily wound upon a suitable rewind reel or mandrel so that it may be conveniently handled in the making of other articles therefrom, such as packing

cushions or gaskets, or a flexible surfacing for various articles, or it may be used in strip form as an article of commerce.

The thickness of the strip is immaterial, and may be varied at will according to the use for which it is produced.

In the accompanying drawings, I have shown an apparatus particularly designed and adapted for the practice of the aforesaid method, by a substantially continuous operation, although it may be found necessary, in order to reduce the length of the machine, to multiply the number of units in the baker or vulcanizer, for conveying the molds and their contents therethrough in order to reduce the speed of traverse of said molds while in the baker or vulcanizer and secure the desired time interval while in the high, and the low, temperature zones respectively, with a baker or vulcanizer of relatively shorter length than would be required if the speed of traverse were higher.

Referring to the drawings, in Fig. 1 I have shown mechanisms adjacent one end of the apparatus, and in Fig. 2 the mechanisms adjacent the other end thereof, it being understood that these mechanisms are located a considerable distance apart, since the baker or vulcanizer (forming the high temperature zone through which the molds and their contents pass), and the course traversed by said molds through the low temperature zone after leaving the high temperature zone, may vary in some instances, according to the available space, from 75 to 125 feet.

The mechanism above referred to comprises a packing unit, preferably adjacent the charging end of the baker or vulcanizer, which packing unit includes a sequence of plungers or rams preferably of graduated lengths in the direction of movement of the molds with relation to succeeding plungers or rams. Said plungers or rams are arranged in a straight line, and are of any desired number according to the length of tubular member desired.

In the accompanying drawings. I have indicated at 10, 11, 12 and 13, four of such plungers or rams, all of which are carried by and movable with a vertically, reciprocatory head 14 which is slidably mounted upon suitable guides 15 arranged upon opposite sides of the machine. Acting upon said head are counterweights 16 connected therewith by flexible connections 17 passing over sheaves 18 carried by a shaft mounted in bearings 19 upon said guides 15. Below the head 14 and extending beyond both ends thereof are tracks 20 upon which move wheeled trucks 21, the upper surfaces of which are provided with annular grooves adapted to receive the molds within which the composition cork is to be packed.

The head 14 is actuated by any desired means, as spaced crank wheels 22, the cranks of which are connected by means of the pitmen 23 with said head. Each of the crank wheels 22 is provided with gear teeth as shown, in mesh with intermediate idler gears 24 so as to cause simultaneous rotation of said crank wheels. One of said crank wheels is rotated from any desired source of power by means of the belt and pulley mechanism 25 shown to the left of Fig. 1.

Each of the plungers or rams 10—13 is in the form of a cylinder, the open end of which is presented toward the cars 21, the walls of said cylinder being of a thickness to enter an annular mold space and compact the cork composition previously delivered within this space, and prior to the introduction of a new charge of composition cork to within same.

Each mold is composed of an outer tubular member 26 and an inner tubular member 27, the relative diameters of these members 26 and 27 being such as to leave a mold space of the desired width. The length of said members may vary, although, as heretofore stated, the mold space should not exceed two inches in width, and is preferably of a smaller dimension than this in order to ensure the effective conditioning of the adhesive or binder throughout the entire mass of cork while within the high temperature zone. The space between the two mold elements 26 and 27 before mounting said elements upon a car 21, is closed at one end by means of a plug 28, the top of the annular mold space after the last charge has been delivered thereto, and compacted therein, being closed by a similar plug 29 as shown in Fig. 1, so as to confine the cork composition between two mold plugs 28 and 29, which have a sufficiently close fit with the walls of the mold elements to resist displacement as a result of expansion of the cork under heat.

In advance of the longest plunger or ram 10 is a filling device consisting of a tubular chute 30 having a cone 31 supported adjacent the outlet thereof so as to effectively distribute the cork composition about the circular mold space. The chute 30 communicates with a cork composition hopper 32 through a measuring device 33 which may be actuated in any desired manner. A similar chute 30 and measuring device 33 is positioned in advance of each plunger or ram 11—13 irrespective of the number of such plungers or rams, each of said chutes being equipped with a similar cone 31 and similar measuring device 33, and all of said chutes communicating with the hopper 32.

The mold elements 26 and 27 are of considerable weight and the packer is not primarily designed for high speeds, the movement of the cars 21 being by hand, although an automatic step by step advancing mechanism might be used without departing from the spirit and scope of the invention.

After leaving the last plunger or ram 13, the mold has the top plug 29 inserted therein and is removed from the car 21 and mounted upon suitable ways 34 leading into the baker or vulcanizer 35 which is heated in any desired manner as by means of the gas burners 36. To secure the desired movement of the mold through the baker or vulcanizer, and also through the low temperature zone beyond same in the direction of movement of the mold, I provide two oppositely disposed chains 37—38 carrying suitable cross bars 39 extending from one of these chains to the other and provided with rollers as 40. The circular molds engage adjacent rollers 40 sufficiently lightly to permit a free rolling action of said molds upon the ways 34, which ways also extend through the low temperature zone indicated at 41 in Fig. 2 of the drawings. Said chains 37—38 pass around suitable sprocket wheels 42—43, one of which as 43 is driven by a belt and pulley mechanism 44 from any desired source of power.

The sprocket wheel 43 is located adjacent the discharge end of the conveyor mechanism by means of which the molds and their contents are passed successively through the high temperature and the low temperature zones upon the ways 34. Adjacent this discharge end is an ejecting mechanism consisting of a suitable support 45 having a central cylindrical column 46 of a diameter substantially conforming to the inside diameter of the mold element 27 and spaced away from the outer wall of the support 45 a distance slightly greater than the distance between the elements 26 and 27 of the mold. The top of this support is rabbeted as shown, to form a suitable annular seat for the bottom of the mold elements.

The space formed by the upper wall of the support 45 and the column 46 forms a receiver for the tubular product ejected from the various molds.

Above the support 45 is a head 47 carrying a cylindrical plunger 48, the open end of which is presented downwardly. The wall of this plunger is of a width corresponding with the tubular mold space.

The cross head 47 is mounted upon suitable vertical guides 49, and is acted upon by counterweights 50 connected therewith by the flexible connections 51 passing over the sheaves 52 upon a shaft 53 mounted in suitable bearings at the upper end of the guides 49. Adjacent the bottom of the machine are crank wheels 54 and 55 connected respectively with the head 47 by the connecting rods 56 and 57. Said crank wheels are provided with gear teeth as shown, which respectively mesh with an intermediate gear 58, so that both of these crank wheels will be simultaneously rotated at the same speed. One of the wheels as 54 is driven from any desired source of power by any desired means as the belt and pulley mechanism 59.

Since when using a sequence of packing plungers or rams graduated in length, one completely packed mold will be delivered with each actuation of said rods after a run of the apparatus has been in progress for a sufficient time to completely pack the first mold, it is apparent that by imparting the same angular speed to the wheel 54 as is imparted to the various wheels 22, the capacity of the ejecting mechanism will be exactly proportioned to that of the packing mechanism.

After the composition cork tube indicated at 60, is ejected from a mold, it is removed from the support 45 and preferably is exposed to the air a sufficient length of time to more thoroughly cure the entire mass of material therein preparatory to cutting it into a strip. The tube 60 after being drawn from the mold may expand slightly and it is possible that both the inside and the outside wall of the tube may become slightly irregular as a result of this expansion.

After the tube 60 has been removed from the ejecting mechanism, it is mounted upon a slicing machine, the construction of which I will now describe. The capacity of this slicing machine is not commensurate with that of the other parts of the apparatus, so that if it is desired to have a well balanced equipment, it is necessary to employ a number of such machines in conjunction with each packing, each baking or vulcanizing and each ejecting unit.

The slicing mechanism comprises a main frame 61 having mounted therein a suitable cutting edge as the band knife 62, which is continuously rotated in any desired manner, as by the belt and pulley mechanism 63. Mounted upon the frame 61 is a swing arm 64 having a weighted friction roller 65 mounted at the free end thereof upon a rotatable shaft 66 which is driven by means of a belt and pulley mechanism 67 from any desired source of power as by the belt and pulley mechanism 68.

Oppositely disposed as to the knife 62 is a supporting roller 69 which with the roller 65 and the knife 62 affords a three-point bearing for the tube 60, two of which points engage the outside of the tube and the third of which, as the roller 65, engages the inside thereof. The knife 62 has associated therewith the usual gauge bar 70 for determining the thickness of the cut of the knife which may be adjusted as is usual with slicing machines employing a band knife, or may be fixed in the event that a cut of the desired thickness is always required of the machine.

Mounted in an extension of the frame 61 is a rewind reel 71, which may be driven in

any desired manner as by the belt and pulley mechanism 72, which will afford that slippage necessary to compensate for the gradually increasing diameter of the roll of strip upon the reel 71.

The operation of the herein described apparatus is substantially as follows:—

A number of mold elements 26 are assembled concentrically with mold elements 27, one end of the annular mold space thus formed being closed by a plug 28 to maintain these elements in proper relative position so that they may be readily mounted upon cars 21 movable upon the tracks 20. These cars are brought along said tracks by hand, or in any other desired manner, into proper relation below the plungers or rams 10, 11, 12 and 13 etc., it being understood that any desired number of such plungers or rams may be employed so long as they are of gradually decreasing lengths in the direction of movement of the cars with relation to the packing mechanism.

When a car is properly positioned, the various valves 33 are simultaneously actuated, by hand or otherwise, to deliver a charge of granular cork, coated as described, into the chutes 30, the spreaders 31 of which will cause a more or less uniform distribution of this charge about the central mold element 26. Thereafter the head 14 is actuated by means of the various wheels 22 and the pitmen 23. As the various plungers or rams are thus forced downwardly, the charge previously delivered to each of the molds will be compacted, the compacting pressure having a tendency to more equally distribute the cork about the mold space as a result of lateral displacement due to the downward pressure of the plungers or rams.

It will be observed that as the molds are progressively advanced, or advanced with a step by step movement, each mold will receive a succession of charges of granular cork, each charge being compacted upon the next downward stroke of the various plungers or rams.

By alternating the plungers or rams and the charging chutes 30, the rams are operative upon only alternate molds, and the feeding movement of the cars 21 will be only one-half the distance between the plungers or rams.

By bringing the tubes or chutes 30 fairly close to the tops of the various molds, likelihood of scattering of the granular cork material is reduced to a minimum, it being understood that the space between the inner and the outer mold elements 26 and 27 will be sufficient to afford a free movement of the granular cork in sufficient volume during each charging operation.

The counterweights 16 are merely to assist the wheels 22 in raising the head 14 and its various plungers, it being understood that the said head is provided with openings about each of the chutes 30 sufficient to avoid any binding or material friction at this point.

It will be readily understood that each of the tubes 60 contains a considerable mass of the composition cork so that high speed in the operation of the machine is not essential to secure a desired output.

As each mold leaves its operative relation to the last of the sequence of graduated plungers or rams, it is removed from the car either before or after the annular plug 29 is forced into the top of the mold opening and is mounted upon the ways 34 leading into the baker or vulcanizer 35, each mold being placed between two parallel rollers 40 so that the movement of the chains 37—38 will push the mold through the baker or vulcanizer 35 and through the cooling zone at the discharge end thereof. I employ this chain and roller mechanism because of the fact that the molds and their contents are of considerable weight, and can be more conveniently supported by ways 34 than by a flexible conveyor member. Furthermore the circular formation of the molds will permit them to freely roll along the ways, which will successively bring all portions of the contents of the mold adjacent the ways 34, at which point the temperature will be relatively higher than toward the top of the baker or vulcanizer, by reason of the close proximity of the gas flames thereto. The opening through the inner tubular mold element 27 will permit the free circulation of heated air and gases therethrough so as to subject both the inner and the outer walls of the molds to the same degree of temperature and thus provide an increased effective surface and bulk for transmitting heat to the contents of the molds.

After leaving the high temperature zone afforded by the baker or vulcanizer 35, the molds pass along the ways 34 for a considerable distance while exposed to atmosphere, so that each mold will radiate considerable of the heat taken up thereby and by its contents while in the baker or vulcanizer, and thus at least superficially cool the surface of the tube 60 adjacent the walls of the mold space.

As each mold reaches the limit of the operative length of the chains 37—38, it is removed therefrom and mounted upon the support 45, the recessed portion of the top of which will accurately center it with relation to the ejecting plunger or ram 48. When the mold has thus been properly positioned, power is applied to the head 47, which will bring the plunger or ram downwardly with sufficient force to eject the completed tube 60 from the mold into the

pocket formed in the support to receive same.

Considerable power is required to eject the completed cork composition tube from the mold because of the large surface contact between same and the walls of the mold, and notwithstanding that the cooling operation results in slight shrinkage at the surface of the tube 60, which will tend to relieve such frictional resistance.

As heretofore stated, each tube 60 may be allowed to stand after being drawn from the mold, for a sufficient length of time to complete the cooling operation, and thus secure an additional curing action of the adhesive or binder. This tube, as removed from the ejector, however, will possess a high degree of resiliency and have sufficient tenacity and homogeneity to permit it to be immediately placed upon the slicing machine.

The slicing operation is done by raising the arm 64, passing the tube 60 over the weighted roller 65, and then allowing the arm 64 to descend so that the weight of the roller 65 will force the tube 60 into engaging relation with the supporting roller 69, the band knife 62 and the gauge bar 70. When power is applied to the roller 65, its frictional engagement with the tube 60 will rotate the latter with relation to the edge of the knife 62, the weight of said roller at the same time forcing the tube toward the knife so that, as a cut about the outer surface is made by the knife, the tube 60 will be progressively forced downwardly so as to cause the desired helical cut and permit the production of a continuous strip of the desired thickness. The supporting roller 69 is used to afford the desired third point of support for the tube while at the same time ensuring its free rotation under the control of the rapidily rotating weighted roll 65.

The strip as it is cut from the tube 60 is passed about and wound upon the rewind reel 71, it being possible by splicing the ends of succeeding strips, or merely laying the end of one to adjacent the end of the other, to form a roll of the desired diameter to permit a continued run of the machine without frequent changing of rewind reels.

If it be found that the inner surface of any tube 60 or the outer surface thereof, or both of these surfaces, are somewhat rough, so as to interfere with the desired smooth surface of the initial and the final cuts from each roll, such surfaces may be ground smooth.

While in the accompanying drawings, I have shown various details of construction of the apparatus, for the purpose of securing the desired co-action of the parts, it is apparent that such details may be varied without varying the essential characteristics of the apparatus, or departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. The method of making composition cork sheets consisting in compacting granular cork and a binder within an annular mold space, subjecting the mold and its contents to the action of heat to make the binder active, cooling the composition cork while within the annular mold space, drawing the tubular product from the mold space, imparting circular movement to the tubular product in relation to a cutting edge and exerting continuing pressure upon said tubular product toward said cutting edge, whereby it will be helically cut to produce a continuous strip of composition cork.

2. An apparatus for making composition cork sheets embodying therein a packing unit including an open end cylindrical ram, means imparting reciprocatory movement thereto, a support for a mold having an annular mold space therein in operative relation to said ram, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby a mold and its contents are conveyed through said baker so as to be successively subjected to an elevated temperature and to a relatively lower temperature, and an ejecting mechanism whereby the tube of composition cork is removed from the mold.

3. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, means imparting simultaneous reciprocatory movement thereto, a support for a plurality of molds movable with relation to said sequence of rams, each of said molds having an annular mold space therein, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby said molds may be passed through said baker so as to subject the molds and their contents successively to an elevated temperature and to a relatively lower temperature, and an ejecting mechanism whereby the tubes of composition cork are removed from the molds.

4. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, means imparting simultaneous reciprocatory movement thereto, a support for a plurality of molds movable with relation to said sequence of rams, each of said molds having an annular mold space therein, means

in advance of each ram whereby a charge of composition cork will be delivered to alternate molds while said rams are operative with relation to molds adjacent those being charged, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby said molds may be passed through said baker so as to subject the molds and their contents successively to an elevated temperature and to a relatively lower temperature, and an ejecting mechanism whereby the tubes of composition cork are removed from the molds.

5. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, a vertically reciprocatory head carrying said rams, a sequence of simultaneously actuated crank wheels, pitmen connecting said crank wheels respectively to said head, whereby reciprocatory movement is simultaneously imparted to all of said rams, a support for a plurality of molds movable with relation to said rams, each of said molds having an annular mold space therein, means in advance of each ram whereby a charge of composition cork will be delivered to alternate molds while said rams are operative with relation to molds adjacent those being charged, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby said molds may be passed through said baker so as to subject the molds and their contents successively to an elevated temperature and to a relatively lower temperature, and an ejecting mechanism whereby the tubes of composition cork are removed from the molds.

6. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, means imparting simultaneous reciprocatory movement thereto, parallel ways beneath said rams, wheeled supports movable upon said ways and each adapted to receive a plurality of molds, each of said molds having an annular mold space therein, means in advance of each ram whereby a charge of composition cork will be delivered to alternate molds while said rams are operative with relation to molds adjacent those being charged, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby said molds may be passed through said baker so as to subject the molds and their contents successively to an elevated temperature and to a relatively lower temperature, and an ejecting mechanism whereby the tubes of composition cork are removed from the molds,

7. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, a vertically reciprocatory head carrying said rams, a sequence of simultaneously actuated crank wheels, pitmen connecting said crank wheels respectively to said head, whereby reciprocatory movement is simultaneously imparted to all of said rams, parallel ways beneath said rams, wheeled supports movable upon said ways and each adapted to receive a plurality of molds, each of said molds having an annular mold space therein, means in advance of each ram whereby a charge of composition cork will be delivered to alternate molds while said rams are operative with relation to molds adjacent those being charged, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby said molds may be passed through said baker so as to subject the molds and their contents successively to an elevated temperature and to a relatively lower temperature, and an ejecting mechanism whereby the tubes of composition cork are removed from the molds.

8. An apparatus for making composition cork sheets embodying therein a packing unit including an open end cylindrical ram, means imparting reciprocatory movement thereto, a support for a mold having concentric inner and outer cylindrical sections and a plug forming an annular mold space therein in operative relation to said ram, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, ways passing through the high and the low temperature zones of said baker, endless chains, one reach of which is positioned above said ways, rods carried by said chains spaced apart a distance substantially equalling the diameter of said molds, whereby said molds will be passed with a rolling action through the high and the low temperature zones respectively, and an ejecting mechanism whereby the tube of composition cork is removed from the mold.

9. An apparatus for making composition cork sheets embodying therein a packing unit including an open end cylindrical ram, means imparting reciprocatory movement thereto, a support for a mold having concentric inner and outer cylindrical sections and a plug forming an annular mold space therein in operative relation to said ram, a baker, means whereby a portion of said

baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby a mold and its contents are conveyed through said baker so as to be successively subjected to an elevated temperature and to a relatively lower temperature, a reciprocatory, hollow, cylindrical ram, means for imparting movement thereto, and a support beneath said ram having an annular opening therein forming a central column and an outer wall adapted to receive the inner and outer mold sections respectively and position the mold space in alinement with the opening in said support.

10. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, means imparting simultaneous reciprocatory movement thereto, a support for a plurality of molds movable with relation to said sequence of rams, each of said molds having concentric inner and outer cylindrical sections and a plug forming an annular mold space therein, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, means whereby said molds may be passed through said baker so as to subject the molds and their contents successively to an elevated temperature and to a relatively lower temperature, a reciprocatory, hollow, cylindrical ram, means for imparting movement thereto, and a support beneath said ram having an annular opening therein forming a central column and an outer wall adapted to receive the inner and outer mold sections respectively and position the mold space in alinement with the opening in said support.

11. An apparatus for making composition cork sheets embodying therein a packing unit including a sequence of open end cylindrical rams progressively graduated in lengths, means imparting simultaneous reciprocatory movement thereto, parallel ways beneath said rams, wheeled supports movable upon said ways and each adapted to receive a plurality of molds, each of said molds having an annular mold space therein, means in advance of each ram whereby a charge of composition cork will be delivered to alternate molds while said rams are operative with relation to molds adjacent those being charged, a baker, means whereby a portion of said baker is maintained at an elevated temperature and another portion thereof at a relatively lower temperature, ways passing through the high and the low temperature zones of said baker, endless chains, one reach of which is positioned above said ways, rods carried by said chains spaced apart a distance substantially equalling the diameter of said molds, whereby said molds will be passed with a rolling action through the high and the low temperature zones respectively, and an ejecting mechanism whereby the tube of composition cork is removed from the mold.

In witness whereof I have hereunto affixed my signature, this 13th day of June, 1923.

CHARLES E. McMANUS.