W. J. KENT.

METHOD OF MAKING MATS.

APPLICATION FILED MAY 6, 1920.

1,413,663.

Patented Apr. 25, 1922.

3 SHEETS—SHEET 1.

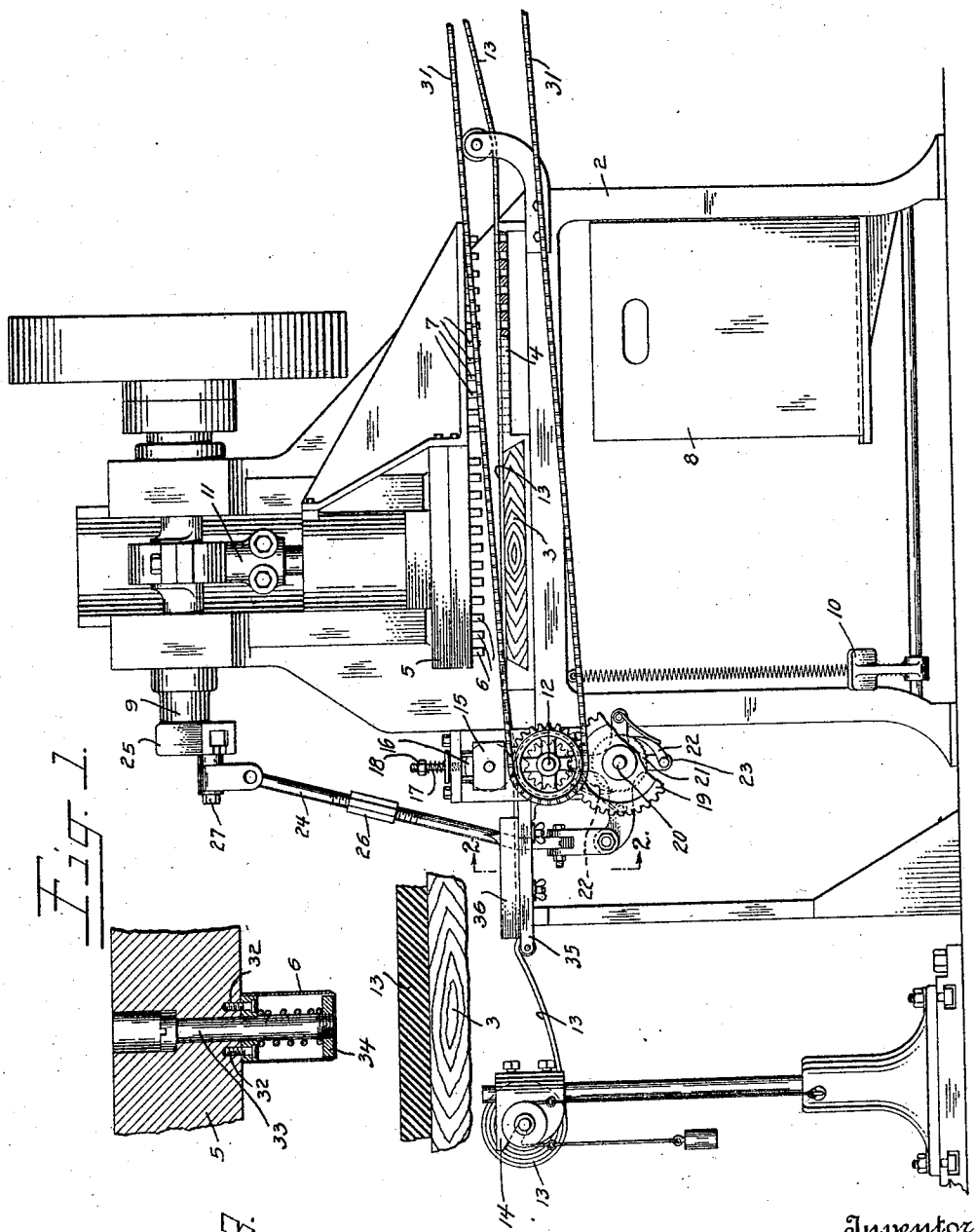


Fig. 1.

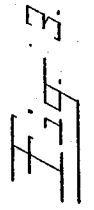


Fig. 3.

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3 SHEETS—SHEET 2.

Fig. 4

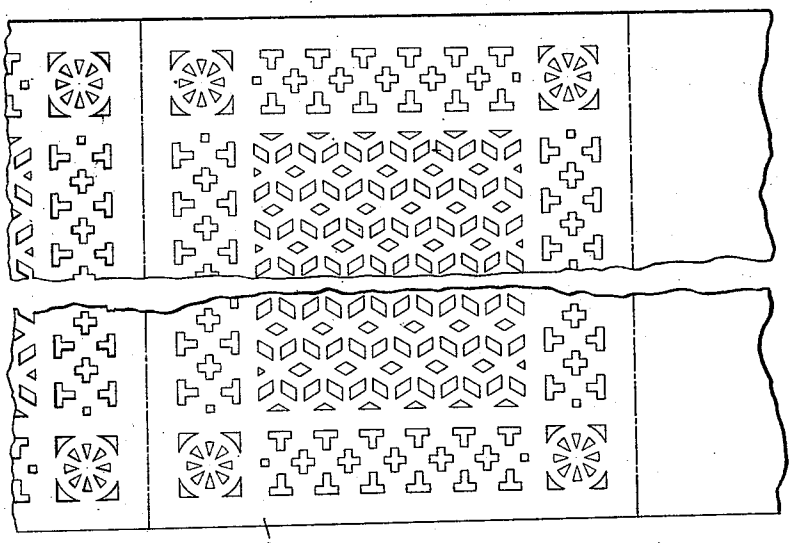
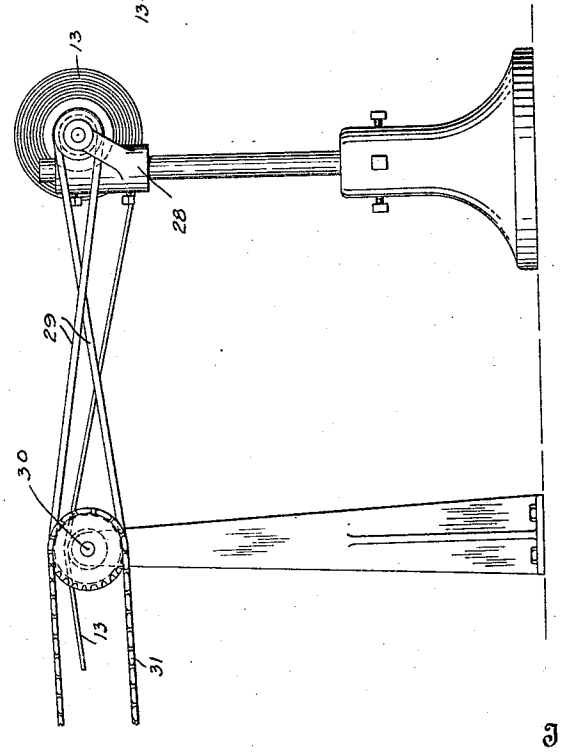


Fig. 1a



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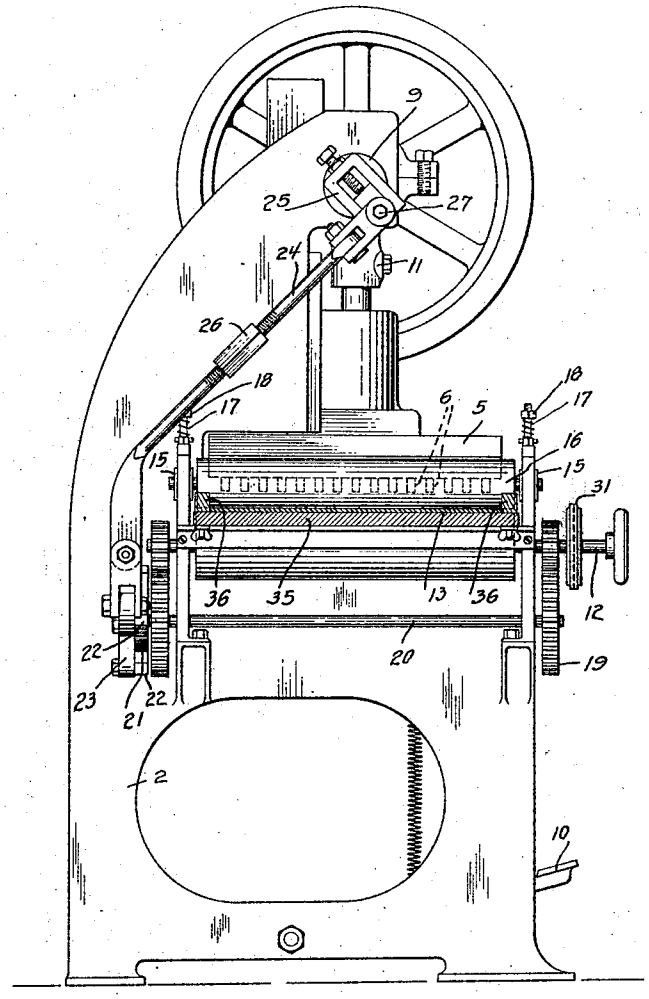
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3 SHEETS—SHEET 3.

Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM J. KENT, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE MECHANICAL RUBBER COMPANY, A CORPORATION OF NEW JERSEY.

METHOD OF MAKING MATS.

1,413,663. Specification of Letters Patent. Patented Apr. 25, 1922.

Application filed May 6, 1920. Serial No. 379,213.

To all whom it may concern:

Be it known that I, WILLIAM J. KENT, a citizen of the United States, residing at Brooklyn, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Making Mats, of which the following is a full, clear, and exact description.

My invention relates to the art of making mats having different designs formed of openings or perforations, and made of rubber or other vulcanizable material.

In the common practice of today, the mats are cut to size, the design laid out on the surface of the mat, and the openings are then punched by hand.

This process is slow, costly, and requires a large area of floor space, when considering the number of square feet of mats turned out in a given period.

The object of my invention is to provide a method of making mats in a continuous manner from a continuous strip.

The machine used in carrying out the method comprises a cutting bed, a plug removing bed adjacent to the cutting bed, a reciprocating cutter or punch head to which cutting punches are secured in a prearranged order above the bed, and an equal number of dummy punches above the plug removing bed which are arranged in the same order as the cutting punches.

The punch head is reciprocated by a crank shaft and a continuous strip is fed through the machine, in a step by step manner by suitable mechanism, in timed relation with the crank shaft.

The cutting punches are arranged to cut the openings to form the design, without removing the plugs, which plugs are removed by the dummy punches after the strip is advanced one step to bring the cut portion under the dummy punches and to bring an uncut portion of the strip under the cutting punches.

The retaining of the plugs in the openings just formed by the cutting punches will stiffen the sheet or strip at this portion, as the walls of the openings which form the design are prevented from collapsing, and as this portion of the strip is retained against distortion, it follows that the uncut portion fed under the cutting punches will lie in a proper position under the punches so that the design will be perfectly formed thereon.

A further object of my invention is to provide a method in which the plugs are positively removed from the openings after a fresh uncut strip has been moved under the punches. This positive removal of the plugs will prevent any of the plugs from being retained within the openings, and prevent the plugs from being rolled between the convolutions of the continuous strip, which would mar the mats.

The precise nature of my invention will be best understood by reference to the accompanying drawings, it being obvious, however, that various changes may be made in the details of construction, and general arrangement of the parts of the mechanism, without departing from the spirit and scope of my invention as defined in the appended claims.

In the drawings,

Fig. 1 and Fig. 1ª illustrate somewhat diagrammatically a side elevation of one form of apparatus for making mats.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1, the section being taken through the continuous strip.

Fig. 3 is a detail sectional view of one of the punches, and

Fig. 4 is a plan view of a portion of the continuous strip, showing the plugs removed from one portion of the strip, while the design has been punched on another portion adjacent thereto, but in which the plugs have been retained within the punched openings.

In these drawings, the reference character 2 designates the frame of a punching machine, having a cutting body 3 and a plug removing bed 4. Mounted for reciprocation in suitable guides in the frame 2 is a punch head 5, having connected directly thereto a series of cutting punches 6 and dummy or plug-removing punches 7. The plug-removing punches 7 are equal in number to the cutting punches 6 and are arranged in precisely the same order, so as to register with the cut openings in that portion of the continuous strip fed under the punches 7, which openings were cut by the punches 6 on the previous stroke of the machine.

The plug-removing bed 4 is provided with suitable openings through which the plugs may fall after being pushed out of the open-

ings by the dummy punches 7, and 8 designates a container below the bed 4 for the reception of the plugs.

Mounted for rotation in the frame 2 is a crank shaft 9, which may be continuously rotated by any suitable connections, or the rotation may be controlled by a clutch actuated by the lever 10. This crank shaft 9 is connected to the cutter head 5 by means of a connecting rod 11, which is arranged to reciprocate the cutter head.

Rotatably mounted in bearings on the frame of the machine is a shaft 12 having mounted thereon a feed roller which engages the lower face of the continuous strip 13, which passes from a roll supported at 14. Mounted in sliding bearings 15 in the frame of the machine is a roller 16, which engages the upper face of the strip 13. This roller 16 is yieldingly held in contact with the upper face of the strip by spring 17, the tension of which is adapted to be adjusted by means of nuts 18.

The feed rolls above described are arranged to be actuated by gearing 19 connecting a shaft 20 to the shaft 12, and mounted on the shaft 20 is a ratchet wheel 21 which is adapted to be actuated by pawls 22 on a pawl crank 23. This pawl crank 23 is loosely mounted on the shaft 20, and is actuated by means of a connecting rod 24 connected to a crank 25 on the crank shaft 9. The connecting rod 24 is provided with universal joints, and is also provided with a turnbuckle 26 for adjusting the length of the connecting rod. The crank pin 27 for connecting the upper end of the connecting rod 24 to the crank 25 is arranged to be adjusted radially along the crank 25, for varying the throw of the pawl crank 23, while the gearing connecting shafts 20 and 12 is also adapted to be changed for varying the feed of the strip 13.

28 designates a take-up roll support for the continuous strip, the roll being frictionally driven by a belt 29 from a shaft 30. The shaft 30 is positively driven by means of a chain 31 which engages a sprocket wheel on the shaft 12.

The punches 6 are made of various shapes, and are arranged to punch the particular design to be formed. These punches are hollow, and are secured to a false bed or plate connected to the bed 5, and are secured by means of screws 32, see Fig. 3. Mounted for reciprocation within each of the punches 6 is a spring-pressed plunger 33 having a head 34 on the lower end thereof, the arrangement being such that when the punches are moved into contact with the strip, the head 34 will contact with the strip and the punches 6 will be forced through the material. As the punches are elevated on the return stroke of the punch head, the punches or cutters 6 will be removed from the formed openings, while the plugs cut from the strip will be retained in the openings. If desired, suitable strippers for the body of the mat may be connected to the punch head 5.

In carrying out my invention, a continuous strip of vulcanized material formed of the proper width is made up into a roll which is mounted on the roll support 14 in front of the punching machine. The end of the strip is then fed between the feed rolls over the feed table 35 and the adjustable guides 36 on the feed table are adjusted, to feed the material in right lines to the feed rolls. In the first operation of the machine, the cutter head is depressed, which will form one mat or a portion of the mat, by cutting the design therein without removing any of the plugs from this portion of the strip. As the punch head 5 is elevated, the strip 13 will be advanced a sufficient distance for the next cut, and transfer the cut design under the dummy punches 7, so that on the next downward stroke of the punch head 5 a second design will be formed by the cutters 6 and the plugs will be removed from the first design by the dummy punches 7, the completed designs being rolled on the roll on the support 28 in a continuous manner by the take-up mechanism.

It is desirable that the dummy punches be disposed directly next to the cutting punches so as to act on the perforated portion of the sheet simultaneously with the punching of the next succeeding portion, as otherwise, owing to the elastic nature of the material, the dummy punches are liable to be out of register with the cut plugs.

It is essential that hollow sharp edge punches be used in connection with an opposed solid bed, owing to the extremely tough and elastic nature of the relatively thick sheet being operated on. If blunt edge or solid punches cooperating with a perforated bed be used, the openings formed are not clean cut or exact, owing to distortion of the sheet around each opening.

The retaining of the plugs within the cut openings will prevent the distortion of the cut portion of the continuous strip, as the walls of the openings are prevented from collapsing, and as this portion of the strip is prevented from becoming distorted, there is no danger of the fresh portion of the strip being fed under the cutting punches 6 being distorted. Furthermore, as the plugs are retained within the openings, under the cutter punches, and are then forced through the material and the bed below the dummy punches, there is no danger of any of the plugs being deposited on top of the sheet, and consequently rolled between the different convolutions of the material on the take-up mechanism.

If the continuous strips are provided with

a fabric backing, the fabric backing is fed directly under the punches so that the fabric will be the first portion cut by the punches, and in this case I prefer to use the cross belt 29 for actuating the take-up mechanism 28 so as to bring the upper side of the mat on the exterior of the roll.

The advantages of my invention result from the provision of a method for continuously forming mats from a continuous strip, whereby I am enabled to form a strip which can be cut up into a plurality of short mats, or a runner made up of a plurality of mats. A further valuable feature is that of retaining all the plugs within the openings from which they have been cut, which will prevent the distortion of that portion of the strip to be next fed under the cutting punches, as well as the step of positively removing all of the plugs from the cut openings in such a manner as to prevent any of the cut plugs from being rolled up with the continuous strip.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. The method of making vulcanized rubber mats which comprises subjecting the vulcanized sheet simultaneously to the perforating pressures of a plurality of hollow dies of suitable contours and arrangement to impart to the sheet a predetermined design, positioning the sheet to present an unperforated portion to the dies spaced a predetermined distance from the design previously formed and repeating the perforating operation to produce a second design spaced from the previously formed design by a stretch of unperforated rubber.

2. The method of making vulcanized rubber mats which comprises subjecting the vulcanized sheet simultaneously to the perforating pressures of a plurality of hollow dies of suitable contours and arrangement to cut plugs from the sheet in a predetermined design while maintaining the plugs in the openings in the sheet formed by the dies, positioning the sheet to present a succeeding unperforated portion to the dies and repeating the perforating operation to produce a succeeding design and simultaneously with the formation thereof removing the plugs from the preceding design.

3. The method of making from vulcanized sheet stock perforated rubber mats consisting of a plurality of similar perforated designs spaced by imperforate portions, which comprises forming an entire design by simultaneously severing a plurality of plugs of material from the sheet in a predetermined arrangement while maintaining the plugs in position in the sheet, repeating the severing operation at spaced intervals on the sheet, and removing the cut plugs from each design simultaneously with the severing of the plugs in the succeeding design.

Signed at New York, N. Y., this 4th day of May, 1920.

WILLIAM J. KENT.