T. P. FARMER.

SAFETY TREAD.

APPLICATION FILED FEB. 12, 1906.

990,968.

Patented May 2, 1911.

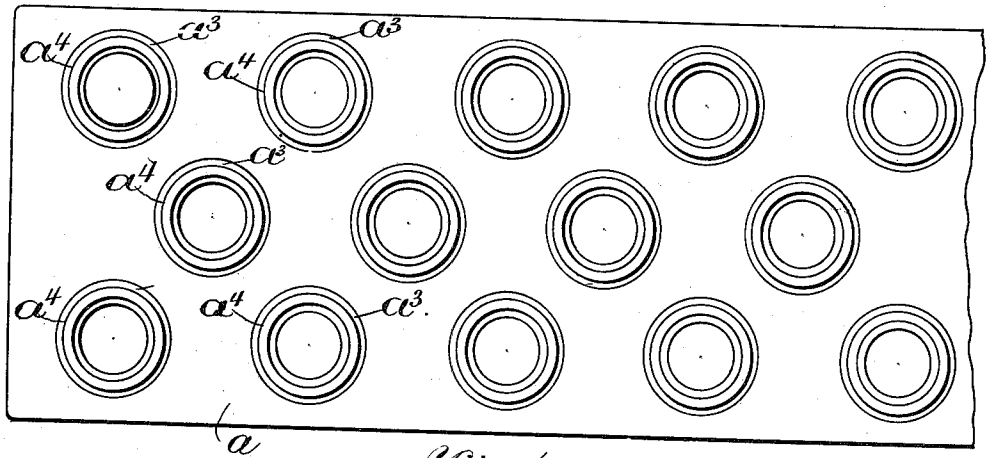

Fig. 1

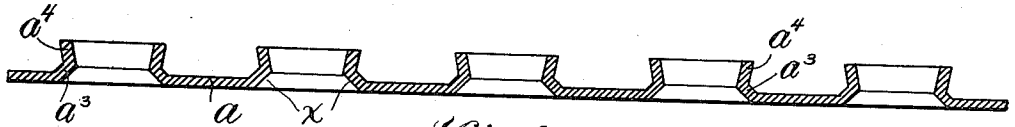

Fig. 2

Fig. 3

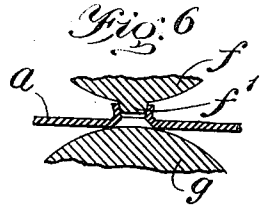

Fig. 6

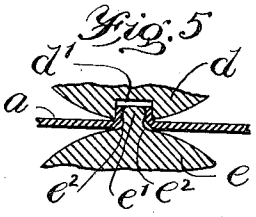

Fig. 5

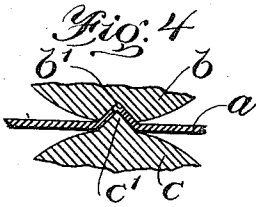

Fig. 4

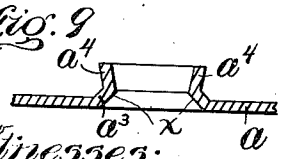

Fig. 9

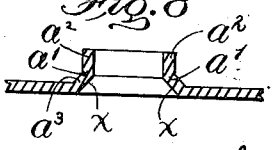

Fig. 8

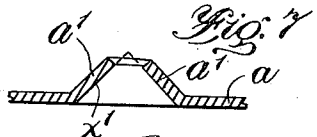

Fig. 7

Witnesses:

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UNITED STATES PATENT OFFICE.

THEODORE P. FARMER, OF SOUTH WEST HARBOR, MAINE, ASSIGNOR TO PROTECTIVE TREAD COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

SAFETY-TREAD.

990,968. Specification of Letters Patent. Patented May 2, 1911.

Application filed February 12, 1906. Serial No. 300,612.

To all whom it may concern:

Be it known that I, THEODORE P. FARMER, of South West Harbor, in the county of Hancock and State of Maine, have invented certain new and useful Improvements in Safety-Treads, of which the following is a specification.

This invention has relation to "safety-treads", so called, in which a base-plate is provided with a plurality of separated sockets for the reception of slip-resisting or anti-slipping material.

The object of the invention is twofold,—(first) to provide a safety-tread in which provision is made for securely anchoring the anti-slipping material in the sockets, and (second) to provide an improved process of manufacturing such treads in such lengths and breadths as may be commercially desirable.

I have found as a result of commercial demonstration that the efficiency of treads in preventing the slipping of persons traveling over them, is greatly enhanced by presenting to the foot of the traveler, a maximum surface of anti-slipping material and a minimum surface of the harder metal of which the base-plate is constructed, and that this can be best accomplished by providing disks or circular plugs of the anti-slipping material, and protecting the outer edges thereof by encircling flanges on the base-plate. This, however, necessitates the employment of some suitable means for securing or anchoring the disks or plugs in the sockets formed by the flanges, and hence I construct the sockets in the form of a double frusto-cone with the bases outward, whereby it is impossible to force the plugs either upward or downward.

In the construction of my improved tread, I first provide a sheet of metal, such as iron or steel, of proper length and width, and, after heating it to the desired temperature, as for instance, a white heat, I pass the heated plate between a pair of rolls, one of which is provided with outwardly projecting dies and the other with complemental sockets. The action of these rolls is to perforate the sheet of metal and form conical protuberances therein, the walls of which are substantially at an angle of 130 degrees to the upper surface of the plate. After passing these rolls, the plate is passed through a second pair of rolls, one of which is provided with upstanding dies or projections and the other with complemental sockets, the action of these dies and sockets being to enlarge the apertures in the plate and to force into substantially perpendicular position the upper portions of the upstanding walls or flanges surrounding the perforations. Then, while still heated, the sheet is passed between a third pair of rolls, the upper one of which is provided with dies or radial projections which are slightly tapering and which project into the apertures formed by the flanges on the plate and bend or flare outwardly the upper edges of the said walls. As a result of this, the sockets formed in the plate are substantially in the form of a double frusto-cone with the bases outward. These rolls, which I have referred to, are all properly spaced and are preferably connected by trains of gearing so that they rotate in peripheral unison. The action of the upper roll of the third pair is to so bend the upper portion of the upstanding walls that they lie at substantially an angle of 5 degrees more or less to a perpendicular to said plate whereas the lower of said upstanding walls are preferably at an angle of substantially 45 degrees to said perpendicular, or thereabout. Thus the apertures or sockets, which extend entirely through the plate, taper outwardly, both upward and downward. The insertion of the anti-slipping or slip-resisting material in the sockets may be accomplished in any suitable manner. I preferably employ lead for the slip-resisting material, inasmuch as it may be crowded into the sockets and compressed in plates.

Referring to the drawings,—Figure 1 represents in plan view the base-plate of my improved safety-tread. Fig. 2 represents a longitudinal section through the same. Fig. 3 represents a longitudinal section through the finished tread. Figs. 4, 5 and 6 repre-

sent in section portions of the rolls by which the plate of the tread is properly prepared for the reception of the anti-slipping material. Figs. 7, 8 and 9 represent the plate in the process of construction.

Referring to the said drawings, the plate is indicated at *a*. This, as stated, may be of any convenient length or breadth, and is thin enough so that it may be hot-rolled as described. In the construction of the plate, the plate *a* is first heated to a high temperature and is passed between the rolls *b* and *c*. The roll *c* is provided with a plurality of dies or projections of which one is shown at *c'*. These dies or radial projections are substantially conical and they are adapted to cooperate with conical recesses or molds *b'* in the roll *b*. The two rolls are geared together to move in peripheral unison, and, as the plate passes between them, the dies *c'* press portions of the metal of the plate up into the molds, or recesses, *b'* and break the metal at the apexes of the conical protuberances thus formed in the upper surface of the plate. The internal wall of each cone or protuberance, as indicated at *x* in Fig. 7, is at an angle of substantially 45 degrees to a perpendicular to said plate, or thereabout.

It may be here stated that the dies and complemental molds or recesses in the rolls *c b* are so spaced and arranged that the sockets in the plate which are produced as a result of this operation are arranged in intersecting rows, as clearly shown in Fig. 1.

After the plate has passed between the rolls *b* and *c*, it passes between the rolls indicated at *d* and *e*. The roll *d* is formed with cylindrical molds or recesses *d'* with which coact dies or radial projections *e'* on the roll *e*. These dies *e'* are partly spherical in form, being undercut at e^2 so that they will not engage those portions of the upstanding walls *a'* of the plate which are nearest the upper surface of the plate. As the dies *e'* approach and leave the molds or recesses *d'*, they act to bend upwardly the upper end portions a^2 of the walls *a*, substantially as shown in Fig. 8, so that they will lie substantially at right angles to the plate. This is accomplished without disturbing the lower portions a^3 of said walls, which continue to remain at an angle of 45 degrees or thereabout to a perpendicular to said plate. After leaving the rolls *d* and *e*, the plate, still in a heated condition, is passed between rolls indicated at *f* and *g*. The roll *g* may have a smooth periphery but the roll *f* has frusto-conical dies or projections *f'* which are adapted to project into the apertures formed by the upstanding walls a^2 and bend said walls outwardly so that they will lie at substantially an angle of 5 degrees to the perpendicular, as indicated at a^4 in Fig. 9. As previously indicated, the rolls indicated at *b* and *c*, *d* and *e*, *f* and *g*, are all actuated to move in peripheral unison and are properly located so that they can operate in sequence upon the plate to give it the final form as shown in Fig. 2.

After the plate has been rolled, to provide the upstanding flanges or walls, shaped as described, the plate is permitted to cool, after which the anti-slipping material is crowded and pressed into the sockets thus prepared for its reception. This may be accomplished by reversing the plate so that the flanges project downwardly, and by means of rolls forcing and crowding the anti-slipping material into the sockets. A suitable plate or support will, of course, be placed beneath the flanges so that the anti-slipping material will be compressed and be prevented from being forced entirely through the sockets. Preferably, the anti-slipping material will be previously formed into disks or plugs which will be dropped into the openings prior to their compression.

It has heretofore been proposed to form the base plates of safety-treads of sheet metal and draw from it upstanding flanges to form sockets for the anti-slipping material, but there is a serious objection to this drawing process in that, as a consequence, the walls are cracked and their upper edges are apt to be serrated. Where the flanges are formed in accordance with my process, by the use of rolls or rotary dies, while the plate is heated to a high temperature, the upstanding flanges are finished and are free from cracks and rough points, and as a result a practically perfect product is insured. The labor in producing the plates is diminished, and the cost of production greatly decreased where they are formed in accordance with my process.

While I have explained my process of manufacture as utilizing rotary dies for forming the walls in the base-plate yet nevertheless it will be understood that I may utilize a series of drop-forging dies for accomplishing the same end, without departing from the spirit and scope of the invention. Such dies may be suitable in number and will operate upon the metal while it is in a highly heated state. In some instances the reciprocating dies may be used to better advantage than the rotary dies although the rapidity of production is increased by the utilization of rotary dies.

Having thus explained the nature of the invention, and described a way of constructing and using the same, although without at-

tempting to set forth all of the forms in which it may be made, or all of the modes in which it may be used, or all of the steps which may be followed, what I claim is:—

The herein described process of producing hard metal plates for safety treads, which consists in heating the plate, and, while the same is hot, forming conical protuberances in said plate, transforming said protuberances into sockets whose inner ends flare downwardly, and then flaring the outer ends of said sockets.

In testimony whereof I have affixed my signature, in presence of two witnesses.

THEODORE P. FARMER.

Witnesses:

M. B. MAY,

C. C. STECHER.