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VULCANIZER

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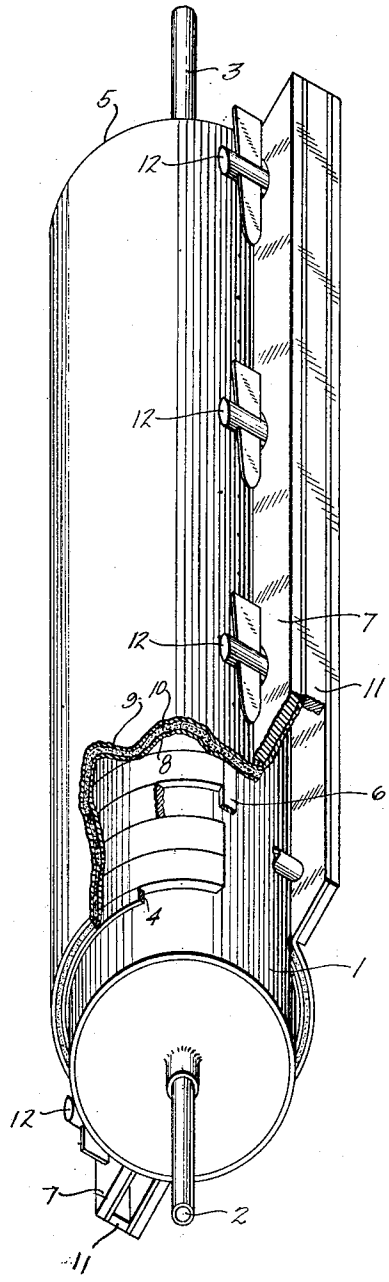

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VULCANIZER

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This invention relates to a vulcanizer and method of vulcanizing. More particularly the invention relates to an apparatus and method of vulcanizing brake linings and/or other similar strip materials.

In the development of high speed machinery and particularly high speed transportation such as automobiles, trucks, etc., the importance of efficient and lasting brakes has increased and with it has increased the demand for molded brake linings. These brake linings molded in various ways to strip form have usually been vulcanized to a curved form, adapted to fit a brake drum or brake shoe, by clamping or strapping it into or onto a curved mold or mandrel and then piling a number of such assembled molds and strips into a vulcanizer, e. g. of the autoclave type. This method is subject to the disadvantage that it requires a large number of molds or mandrels in order to fill the vulcanizer. Furthermore, since it is not feasible to open the vulcanizer at short intervals and introduce small charges it is necessary to have an equally large number on the outside that are being loaded and unloaded preparatory to the next heat or charge. This means the tying up of a great deal of expensive equipment, as the mandrels or forms are only actually producing while they are in the vulcanizer. Another disadvantage is that steam consumption is high, due to the fact that one has completely to blow down the vulcanizer at the end of the vulcanization of each charge, thereby losing all the steam, and furthermore because each full charge of mandrels and forms are thoroughly cooled during the time that they are out of the vulcanizer and must be reheated at the beginning of each vulcanizing operation. This cooling of the mandrels and molds and the blowing down of the vulcanizer are of further disadvantage because the time required for the introduction of steam and the heating of the molds and mandrels up to the vulcanizing temperature lengthens the time required for each vulcanizing operation and therefore reduces the productive capacity of the vulcanizer. The time required for loading and unloading and for opening and closing the heavy doors of the vulcanizer is also a very material item. Finally, the floor space required for storage of the very large number of duplicate molds increases the overhead expense.

It is an object of my invention to provide a vulcanizer and a method of vulcanizing which will be simple to operate, which will permit of a substantially continuous operation and which will require a minimum number of molds and mandrels and a minimum of floor space. It is also an object of my invention to substantially reduce the heat requirements for vulcanization.

Toward attaining the above objects I have departed entirely from the usual practice and have provided a mandrel, advantageously a cylindrical mandrel, which may be permanently positioned convenient to the location where the unvulcanized strips are to be assembled in the molds. Advantageously the mandrel is a hollow cylindrical steel shell which is vertically positioned and permanently connected to a steam line so that steam of any desired temperature may be circulated therethrough. The molds which are used in this mandrel are made of complementary shape so that when two or more are clamped together about the periphery of the mandrel they will press the brake lining against the mandrel. Some means is to be provided for preventing excessive cooling through the mold of the outer surface of the material being vulcanized. To this end the mold may be separately heated but advantageously is heat-insulated so as to prevent excessive heat loss through the mold. Or the mold may merely be made sufficiently heavy so that its inner surface will remain at a temperature high enough for effective vulcanization.

The strips of unvulcanized material are placed in these concave mold sections and the section with its charge of vulcanizable material is then placed over the mandrel and pressed thereagainst, advantageously by clamping it to another similar section or sections, so that together they surround the mandrel. Since the mandrel is already hot when the mold and its charge are positioned

thereon vulcanization begins almost at once. When the vulcanization is complete the molds are removed from the mandrel and other similar molds are immediately put in position. The molds thus removed may be emptied and refilled at once and almost as soon as it is refilled may be put in place on the same or another mandrel. Thus, by the use of several mandrels operating in staggered time relation, the equipment may be utilized to its fullest extent and the heat loss due to the cooling of the equipment may be very greatly minimized.

In the accompanying drawing I have illustrated a preferred embodiment of my invention shown in perspective and partially broken away to disclose parts on the inside of the mold and the position of the material being vulcanized.

In the drawing, 1 represents a cylindrical steel drum, one end of which is connected to a steam inlet pipe 2, the other end of which is connected to a steam exhaust pipe 3. This drum may be positioned either vertically or horizontally or in other desired position. I prefer, however, to position it vertically. A mold 5 fits over the drum. A steel strip 4 is secured to the inner face of the mold near one end for positioning the material on the mold and for forming a square edge on the end strip; and at the opposite end a similar abutment may be formed by, secured to, or positioned upon the inner face of the mold to similarly guide and mold the edge of the strip on the opposite end from the strip 4.

A steel strip 6 is positioned at the edge of the mold face on either side; and the two strips thus define a space which is substantially the circumferential width equal to the length of the strips to be vulcanized therein. The sides of the mold project and are secured to a reinforcing strip 7 so as to form a relatively inflexible radial flange. The body of the mold is made of an inner sheet metal piece 8, an outer sheet metal piece 9 and an intermediate filling 10 of asbestos, rock wool or other heat-insulating material. The body therefrom is relatively flexible, while the flange 7 is relatively inflexible. Between the flanges of adjacent mold sections when assembled about the mandrel a strip 11 is placed. In the preferred embodiment this strip is secured to one of the flanges 7 for greater ease in assembling. Inwardly from the strip 11 are a series of bolts 12, shown in the present case as wedge bolts for quick tightening and release. Due to the flexibility of the mold 5 and the relative inflexibility of the flange 7 the bolts 12 rock the flanges 7 about the sealing strip 11 as a pivot and thus draw the molds 5 tightly over the drum 1 so as to exert a wrapping pressure against the material being vulcanized. The bolts 12 are also secured to one of the flanges 7, in the preferred embodiment, for quick assembling. The strip 11 being at the outside edge of the flange 7 and permitting the flanges to rock together or apart effects the sealing of the gap between the flanges 7 without interfering with the movement of the edge of the mold 5 and adjacent edge of the flange 7, as may be necessary for the tightening of the mold 5.

In using the apparatus just described steam is turned into the mandrel to heat it to the desired temperature. The strips of unvulcanized composition, as, for example, strips of unvulcanized brake lining material which are advantageously made by extruding, for example, according to the method claimed in the copending application of Abert and Whitelaw, Serial No. 376,639, filed July 8, 1929, are cut to the desired size. Molds are then taken having the longitudinal abutments 6 spaced circumferentially equal to the length of the strips to be vulcanized. The strips are put in place by positioning their ends behind the abutments 6 and snapping them back against the mold, in which position they are held by their own resiliency. The mold may thus readily be loaded with the unvulcanized material and may be freely handled without danger of the unvulcanized material falling out from the mold.

Complementary mold sections are then placed in position over the mandrel and the wedges or other tightening means are set down so as to clamp the molds tightly about the mandrel. The molds are left in this condition until the vulcanization is complete. The wedges are then driven out from the bolts 12 and the molds 5 are removed from the mandrel and may be replaced at once by other molds which have in the meantime been filled with unvulcanized material. The molds with the vulcanized strips therein are permitted to cool sufficiently for the removal of the vulcanized strips and may then be at once refilled with the unvulcanized material and applied to another heated mandrel from which other molds with vulcanized strips have just been removed. Or if only a single mandrel is being operated the molds may be left longer to await the completion of the second vulcanization when they will replace the second set of molds.

It will be observed that the molds which are used in this preferred embodiment are of very light construction and are therefore very easily handled in assembling, disassembling and moving from place to place. I find it an advantage, when such light molds are used, to have them entirely free so that they may be moved to any convenient location and used on any mandrel with the minimum amount of floor space required and a minimum of confusion. If, however, heavier molds are used it is advantageous and in any case it may be desirable, to mount the molds pivotally upon a standard so that they may be swung into assembled relation over the

mandrel or may be swung away from the mandrel for loading or unloading. If this is done, the standard may be either permanently positioned beside the mandrel, in which case advantageously two or more standards, each carrying its set of molds, could be positioned adjacent to each mandrel so that one might be in use while another was being emptied or reloaded; or the standards could be mounted upon casters, or in other ways, so as to be movable and thus could be moved up to a mandrel for a vulcanizing operation, away from the mandrel for loading or unloading and up to another mandrel for a subsequent vulcanizing operation.

In some cases, and particularly where a permanent standard, as suggested above, is used, the molds as well as the mandrel may be heated. I have found that this is unnecessary however; and the provision of suitable heat-insulation is entirely sufficient for satisfactory vulcanization. The use of heat insulation instead of positive heating means is economical of heat since the losses from the mold are less and furthermore permits of a lighter mold construction or greater flexibility of the system since no connections, either electrical or piping, need be maintained, nor made, nor broken between the heating means in the mold and the steam or electrical line.

Although I have described above a preferred embodiment of my invention, it will be understood that many changes may be made within the scope of my invention. For example, the strips 4 and 6 instead of being separate steel strips can be made merely as angular abutments formed by shaping of the metal of the mold or, for example, the strips 4 may be separate resilient strips which may be sprung into place between the strips 6 in the same manner that the strips of vulcanizable material are sprung into place. Obviously also a different type of construction may be used for the mold, different fastening means than those shown may be used to clamp the mold together, a greater or less number of complementary molds may be used surrounding the mandrel, and other means may be used to close the gap between the complementary molds, or the gap may even be left open, although with somewhat greater heat loss resulting therefrom; and other clamping means may be utilized. These and many other changes and modifications may be made all within the scope of my invention as defined in the following claims.

What is claimed as new is:

1. A vulcanizer for brake lining or similar strip material comprising a convex heated mandrel, a concave mold adapted to be clamped laterally onto said mandrel and longitudinal abutments on the mold face spaced transversely on the mold face a surface distance substantially equal to the length of the strips, between which the resilient unvulcanized strips may be sprung and held by their own resiliency.

2. A vulcanizer comprising an approximately cylindrical mandrel, a plurality of flexible sheet metal molds adapted together to surround the mandrel and the material being molded thereon, but to leave a gap between circumferentially adjacent edges of the molds, means for closing said gap between the edges of the molds adapted to leave said edges free to be moved toward each other, and means for drawing the edges of the molds together, whereby to clamp the molds more tightly about the mandrel and the material being molded.

3. A vulcanizer as defined in claim 2, in which the molds have projecting relatively inflexible flanges, the means for sealing the gap comprises a spacing strip between the outer edges of said flanges, and the means for drawing the edges of the molds together comprises clamping means acting upon said flanges inwardly from the spacing strip whereby to rock them upon the spacing strip as a fulcrum and thereby to draw the flexible molds tight over the material being molded.

Signed at Passaic, N. J., this 16th day of September 1930.

JOHN H. MATTHEWS.