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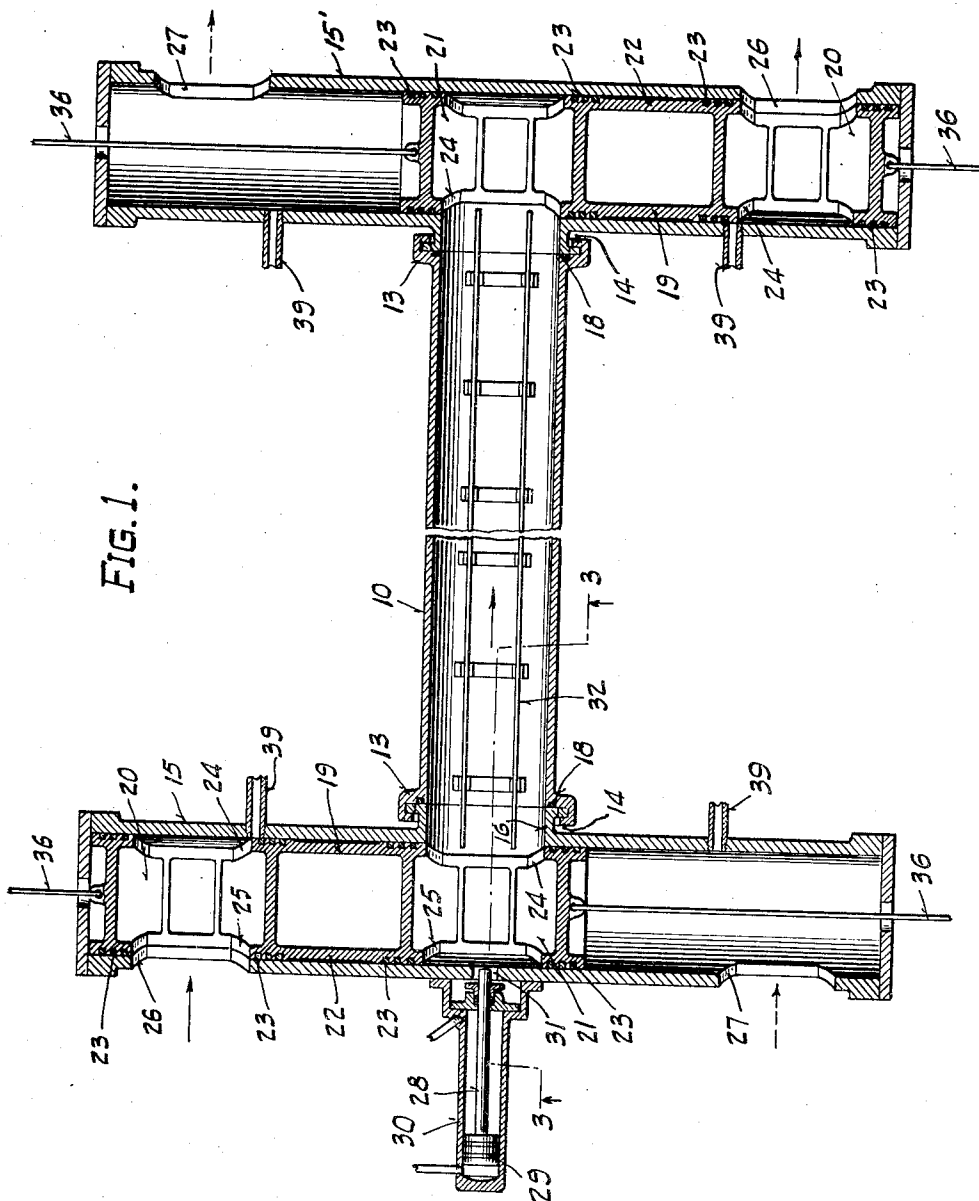
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VULCANIZER

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VULCANIZER

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My invention relates to vulcanizers.

One method commonly employed in the commercial vulcanization of rubber articles consists in placing the rubber-charged molds into a steam tight container, commonly known as an auto-clave, where they are directly exposed to the heat of live steam under pressure for predetermined time periods. Access to the auto-clave is ordinarily had through a suitable door provided at one or both ends thereof.

With the equipment heretofore used the process is intermittent. After each vulcanizing period the steam pressure within the auto-clave must be exhausted before a door can be opened to permit withdrawal and replacement of the molds therein, and after each charge of fresh molds the steam pressure must be reestablished to provide the necessary vulcanizing temperatures. Each actual vulcanizing period is ordinarily relatively short and the mold replacement periods frequent thereby entailing a considerable loss of steam and of valuable time.

One object of the present invention is to provide a method and means for effecting a substantially continuous vulcanizing process.

Another object is to provide means for admitting articles to a steam charged container without releasing the steam pressure therein.

Another object is to provide means for withdrawing articles from a steam charged container without releasing the steam pressure therein.

Another object is to provide a method and means for subjecting a substantially continuous succession of articles to steam under pressure.

Other more specific objects and advantages will appear, expressed or implied, from the following description of an illustrative embodiment of the present invention.

In the accompanying drawings:

Figure 1 is a horizontal longitudinal sectional view of a vulcanizer constructed in accordance with the present invention.

Figure 2 is a vertical longitudinal sectional view of the charging device shown in Fig. 1.

Figure 3 is a vertical sectional view taken along the line 3—3 of Fig. 1 on a larger scale.

Figure 4 is a sectional view taken along the line 4—4 of Fig. 3.

Figure 5 is a diagrammatic view of a fluid actuating system employed.

The vulcanizer selected for illustration includes a conventional auto-clave 10 in the form of a horizontal elongated cylinder supplied with steam under pressure through a pipe 11 and having an exhaust and drain pipe 12. The auto-

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clave shown is of a type that is ordinarily closed at both ends by circular doors (not shown) adapted to seat within rings 13 provided at the opposite ends thereof, each ring being equipped with the usual series of inturned lugs 14 for releasably locking the doors in place.

In this instance the doors are omitted, the ends of the auto-clave being permanently closed by devices through which rubber-charged molds may be admitted thereto and discharged therefrom without releasing the steam pressure therein. Devices for these purposes may assume various forms but those shown have proven satisfactory. Each comprises a cylinder 15 or 15' having a short laterally projecting throat 16 intermediate the ends thereof adapted to seat within one of the end rings 13. A series of outwardly projecting lugs 17 on each throat are arranged to pass between the lugs 14 of the ring 13, as indicated in Fig. 4, and to interlock with and behind the latter upon rotation of the throat through a small angle. In this manner each cylinder 15 or 15' is releasably but securely attached to an end of the auto-clave 10, a suitable packing 18 being preferably provided to seal the joint therebetween.

Each cylinder 15 or 15' constitutes a housing and guide for a piston-like shuttle 19 lengthwise reciprocable therein. Each shuttle 19 is preferably shaped to provide two end chambers 20 and 21 separated by an intermediate portion 22 and suitable means, such as piston rings 23 adjacent the opposite ends of each chamber, coact with the interior of the cylinder 15 or 15' to seal the latter against escape of steam therethrough.

In the device shown each chamber 20 and 21 has an opening 24 at one side thereof, adapted to register with the throat 16 alternatively and each also has a second opening 25 at the opposite side thereof adapted to register with one of the openings 26 or 27 in its guide cylinder whenever the opening 24 of the other is registered with the throat 16.

Chambers 20 and 21 in the cylinder 15 constitute receiving chambers through which the rubber-charged molds *a* may be admitted to the auto-clave 10. For instance, with the chamber 20 in the position shown in Fig. 1 it may receive a mold through the opening 26, and then the shuttle 19 may be shifted to register the chamber 20 with the throat 16 through which the mold may be transferred into the auto-clave 10. Likewise, with the shuttle 19 in the position last described the other chamber 21 is in position to receive a mold through the opening 27, and when the shuttle is

shifted into the position first named, this chamber 21 registers with the throat 16 and the mold therein may be transferred into the auto-clave.

Provision is made for effecting the transfer of the mold to the auto-clave as each chamber is registered therewith. In this instance a pusher in the form of a piston rod 28 is utilized for this purpose. The rod 28 is shown connected to a piston 29 reciprocable in a cylinder 30 attached to the cylinder 15. The rod 28 is disposed coaxially of the auto-clave 10 and works through an opening 31 in the side wall of cylinder 15. The arrangement is such that whenever one of the chambers 20 or 21 is registered with the throat 16, the piston 29 and rod 28 are actuated to push the contained mold through the throat and onto the track or runway 32 in the auto-clave, and as each additional mold is thus forced into the auto-clave it forces ahead of it the succession of molds previously admitted thereto. The molds are thus advanced step-by-step through the auto-clave.

The shuttles 19 in the cylinders 15 and 15' are actuated substantially simultaneously so that one or the other of the chambers 20 and 21 in the latter is aligned with the auto-clave 10 and in a position to receive the leading mold of the succession of molds at each advance thereof through the auto-clave. For instance, with the shuttle 19 of cylinder 15' in the position shown in Fig. 1, the chamber 21 thereof is positioned to receive a mold from the auto-clave, as the succession of molds in the latter are advanced by the pusher 28; and when this shuttle is shifted to position the other chamber 20 in alignment with the auto-clave, the chamber 21 registers with the opening 27 in the cylinder 15' through which the mold within chamber 21 may be withdrawn.

The shuttles 19 may be actuated by any appropriate means. In this instance each is hydraulically actuated by a piston 33 or 33' arranged in a cylinder 34 or 34' mounted on and extending lengthwise of its cylinder 15 or 15'. Each piston shown is provided with tail rods 35 separately connected to the opposite ends of the shuttle 19 through cables 36 trained over suitable pulleys 37. Liquid under pressure from an appropriate source 38 is supplied to both cylinders under control of a suitable valve 39 in such manner that, with the valve in one position, the two pistons 33 and 33' and their connected shuttles 19 are simultaneously actuated in opposite directions, and in the other position of the valve both are simultaneously actuated each in a reverse direction.

It will of course be understood that the steam pressure within the auto-clave 10 is continuously maintained, this being rendered possible by the means provided for admitting and discharging the molds without opening the auto-clave. By reason of this arrangement the vulcanizing process is continuous, each mold being subjected to the direct head of the steam throughout its passage from its charging chamber 20 or 21 to its discharge chamber 20 or 21, the vulcanizing period for each mold being determined by the time consumed during that passage and consequently by the length of the auto-clave and by the frequency of operation of the charging and discharge means. In order to shorten the vulcanizing period for some special molds an auxiliary discharge unit similar to that above described may be provided intermediate the ends of the auto-clave or between sections thereof and operable to discharge those particular molds at an intermediate point.

It will be noted that, as each chamber 20 or 21 passes from communication with the auto-clave 10, it carries with a charge of steam received therefrom, a charge which, if permitted to issue through the openings 26 or 27, might prove dangerous or at least annoying to the attendants serving those openings. In order to avoid this discharge ducts 39 are preferably provided in the rear wall of each of the cylinders 15 and 15' through which the steam pressure may escape as each chamber approaches an opening 26 or 27.

Various changes may be made in the embodiment of the invention hereinabove specifically described without departing from or sacrificing the advantages of the invention as defined in the appended claims.

I claim:

1. The combination with an elongated vulcanizing chamber containing steam under pressure, of separate means for admitting articles to one end of said chamber and for withdrawing articles from the other end of said chamber without releasing the steam pressure in said chamber, said article admitting means comprising a housing extending across an end of said chamber and having an intermediate side opening communicating therewith, a member in said housing forming two separate article receiving compartments therein, said member being reciprocable to align said compartments with said opening alternatively, and means reciprocable in a direction lengthwise of said chamber for transferring articles from an aligned compartment to and through said chamber.

2. The combination with an elongated vulcanizing chamber containing steam under pressure, of separate means for admitting articles to one end of said chamber and for withdrawing articles from the other end of said chamber without releasing the steam pressure in said chamber, each of said means comprising a housing extending across an end of said chamber and having an intermediate side opening communicating with said chamber, a member in each housing forming two separate article receiving compartments therein, each of said members being reciprocable to align said compartments with said opening alternatively, and each of said housings having additional openings affording access to said compartments alternatively, and means reciprocable in a direction lengthwise of said chamber for advancing articles from an aligned compartment into and lengthwise of said chamber.

3. The combination with an elongated vulcanizing chamber containing steam under pressure, of separate means for admitting articles to one end of said chamber and for withdrawing articles from the other end of said chamber without releasing the steam pressure in said chamber, each of said means comprising a housing extending across an end of said chamber and having an intermediate side opening communicating with said chamber, a member in each housing forming two separate article receiving compartments therein, each of said members being reciprocable to align said compartments with said opening alternatively, and each of said housings having additional openings affording access to said compartments alternatively, means for simultaneously reciprocating said members, and means reciprocable in a direction lengthwise of said chamber for advancing articles from an aligned compartment into and lengthwise of said chamber.

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