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W. L. FAIRCHILD

LOCKING MECHANISM FOR MOLDS FOR TIRES, TUBES, AND THE LIKE

Filed Feb. 24, 1925

2 Sheets-Sheet 1

Fig. 1

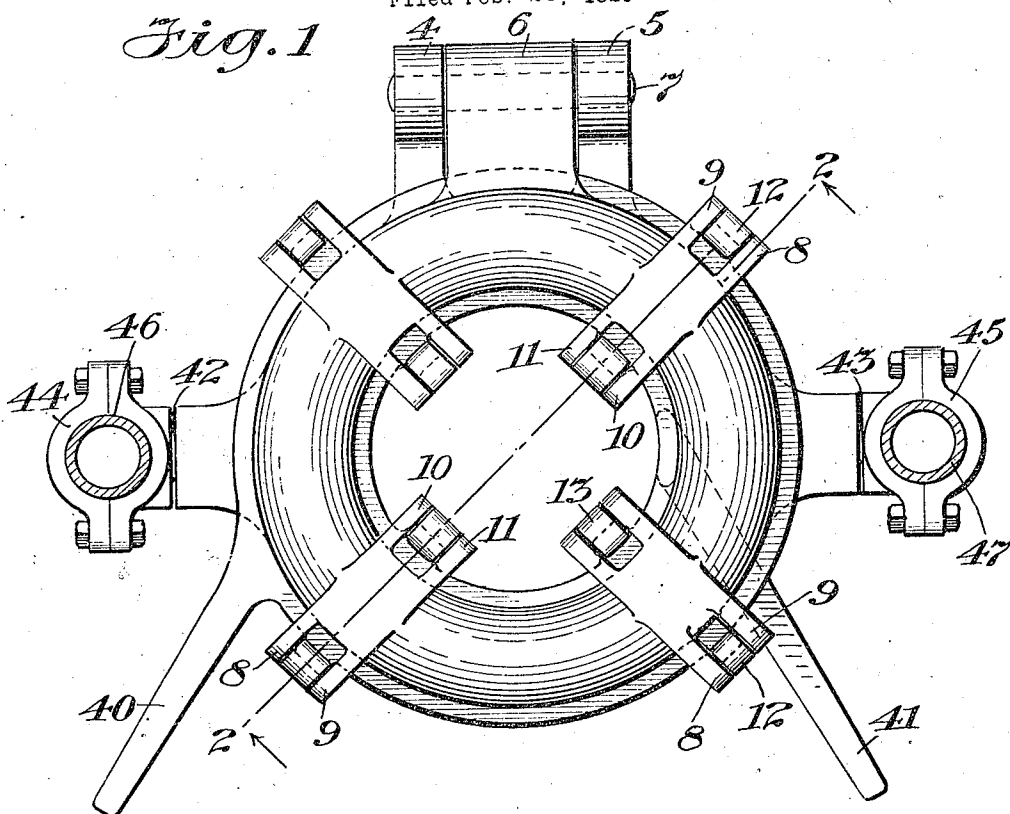
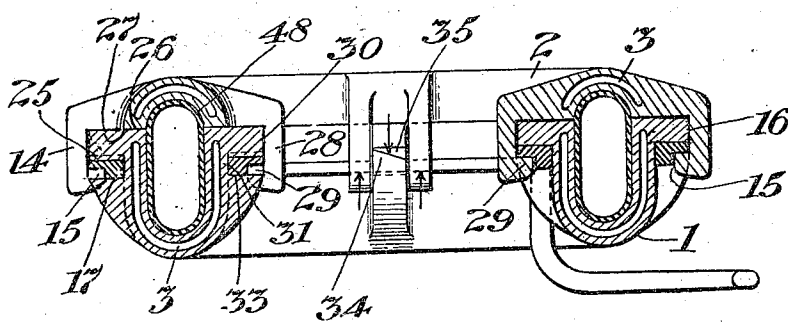


Fig. 2



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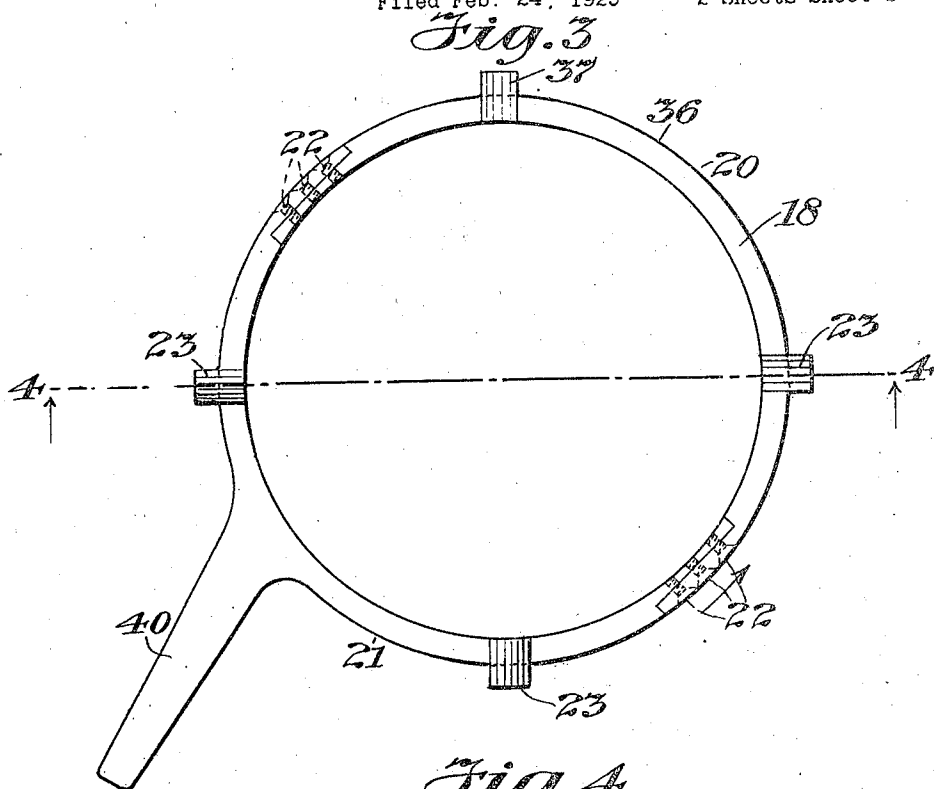
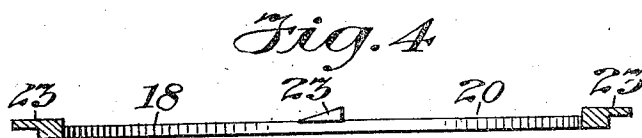
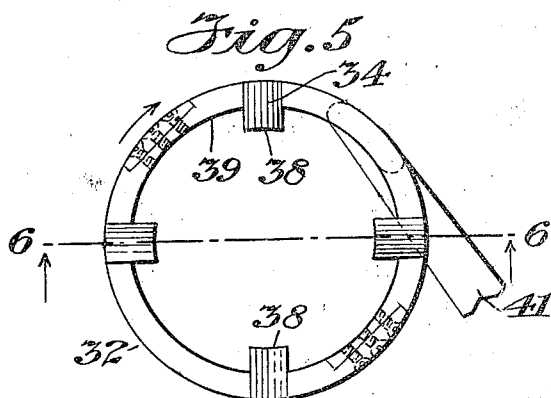
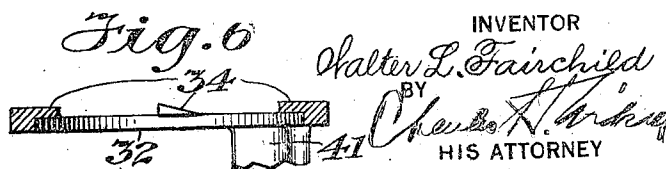
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LOCKING MECHANISM FOR MOLDS FOR TIRES, TUBES, AND THE LIKE

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2 Sheets-Sheet 2



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LOCKING MECHANISM FOR MOLDS FOR TIRES, TUBES, AND THE LIKE.

Application filed February 24, 1925. Serial No. 11,009.

This invention relates to improvements in molds for pneumatic tire casings, pneumatic tubes and the like and one of the objects of the invention is to provide new and improved means for locking together the sectional parts of the mold.

Another object of the invention is to provide locking means of the above character for molds of such construction that the locking operation can be more efficiently and expeditiously accomplished than has obtained in similar devices as hitherto constructed.

Another object of the invention is to provide a new and improved device for locking together the sectional parts of a tire or tube mold wherein all parts of the mold are simultaneously locked together or removed from such locked condition by a single operation.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles, constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawings wherein I have illustrated a preferred form of embodiment of my invention:

Figure 1 is a top plan view of a mold particularly adapted for vulcanizing pneumatic tubes, showing my improved locking mechanism associated therewith;

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1 looking in the direction of the arrow.

Fig. 3 is a top plan view of the locking ring adapted to be employed for locking the outer periphery of the circular mold;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3;

Figure 5 is a top plan view of the locking device employed in connection with the inner periphery of the mold; and

Figure 6 is a vertical sectional view taken on the line 6—6 of Figure 5.

In the accompanying drawings, similar reference characters refer to similar parts throughout the several views.

Before proceeding to describe the construction of my improved mold locking device, it may be here noted that said locking device is adapted to be employed between

the circular housed sections of a tube mold constructed in accordance with the disclosure of my pending application Serial No. 521,391, filed December 9th, 1921, wherein the two sections are hingedly connected together so that they may be swung apart to permit the unvulcanized tube to be inserted therein or a vulcanized tube to be removed therefrom. In a tire mold of this character it is of prime importance that the meeting faces of both sections of the mold be held in tight contact during the molding operation. It is also of prime importance that both the locking and unlocking operations be accomplished in the shortest possible time, owing to the fact that the mold sections are in a heated condition. Otherwise, the rubber compound which is in a plastic condition, rapidly loses its form due to the heat of the mold. Various means have hitherto been employed to lock together the meeting faces of sectional molds of this character, such for instance as clamp screws, clamps and the like, all of which involved the expenditure of considerable time and effort in the performance of the locking and unlocking operations. In my improved mold locking device, which I shall now proceed specifically to describe, I have cured the objections inherent in devices of this character as hitherto constructed and have provided a locking device which is not only efficient in operation but which may be operated with a minimum of expenditure of time and labor.

Referring now to the drawings the reference numeral 1 denotes the lower section of the mold and 2 the upper section thereof, both of said sections being hollow and circular in form. In the present instance the lower section is larger in cross-sectional area than the upper one, that is, the mold is so divided horizontally that the major part of the tube to be vulcanized is located in the lower section of the mold.

It will be noted that the bore or circular channel provided by the mold sections when they are in locked position as shown in Figure 2, is substantially elliptical in form, whereby the tube produced by the molding operation will have a corresponding elliptical form. In the present instance the molds are steam jacketed, passageways 3 being provided in each of the mold sections through which the steam employed to heat the mold may be passed. The lower section 1 is pro-

vided with a pair of spaced outwardly extending bosses indicated at 4 and 5 between which extends a laterally extending boss 6, mounted upon the upper section of the mold, said bosses being pivotally connected together as by means of a pivot pin 7. In this connection it may be noted that it is desirable that a slight looseness or play be provided in the hinge or pivotal connection of the mold sections, as indicated by the dotted line, so as not to interfere with the bringing of all parts of the meeting surfaces of the mold into closed relation by the locking mechanism. The upper section 2 of the mold is provided with a plurality of pairs of laterally extending lugs 8 and 9 and likewise with a plurality of pairs of inwardly extending lugs 10 and 11, said pairs of lugs being preferably spaced in equi-distant relation about the outer as well as the inner periphery of said section. The lower section 1 of the mold is provided with a plurality of outwardly extending lugs 12 and also with a plurality of inwardly extending lugs 13, said lugs 12 and 13 being also equi-distantly located in spaced relation on the outer and inner peripheries of the lower section of the mold, the lugs upon both sections being so correlated that when the mold sections are in assembled relation the single lugs 12 and 13 of the lower section will extend between the lugs 8-9, 10-11 of the upper section.

Each of the lugs 8 and 9 of the upper section is provided with a downwardly extending part 14, and each of said parts 14 is provided with an inwardly extending flange 15, so that channels 16 are formed in the lugs mounted upon the upper section of the mold, said channels facing inwardly. The lugs 12 of the lower section are provided with lateral channels 17, in which is mounted a ring 18, said ring resting upon the lower straight face 19 of the channel 17. It will be noted that in order to mount this ring within said channel, the ring is divided into two parts 20 and 21, having overlapping portions fastened together as by means of the clamp screws 22. The ring 18 is provided with a plurality of wedge members 23, each of said wedge members having inclined wedge surfaces as shown in Fig. 4.

Fastened to the upper face of the wall of the lateral channel 17 of the lugs 12 are wedge blocks 25, the construction being such that when the ring 18 is rotated, the wedge faces 24 of the wedge members 23 are carried into contact with the faces of the wedge blocks 25 of the lower section; this wedging action forcing the lugs 8 and 9 of the upper section downwardly, and the lugs 12 of the lower section upwardly, whereby the meeting faces 26 and 27 of the mold sections are forced into close contact and held in this position. In this connection it may be noted

that the meeting faces 26 and 27 of the mold section are so accurately ground, that all parts thereof lie in close contact, thereby providing against any part of the rubber comprising a tube being subjected to the vulcanizing process being forced by pressure between said meeting faces, whereby an objectionable web or fin would be provided upon the tube. The inner lugs 10 and 11 of the upper section are likewise provided with downwardly extending parts 28, and the inwardly extending flanges 29, providing the outwardly facing channels 30 and the inner surfaces of the lugs 13 of the lower section of the mold are likewise provided with the channels 31, adapted to receive the inner locking rings 32, said ring resting upon the lower surfaces 33 of said channel. This ring is also provided with the wedge members 34, which co-operate with wedge blocks 35, mounted upon the upper surfaces of the channel 31, formed in the lugs 13 of the lower section of the mold. In other words, the lug and locking wedge construction provided for the outer periphery of the mold sections is duplicated on the inner periphery of said mold sections. The wedging surfaces, however, of the wedges provided upon the lugs and also upon the locking ring of the inner periphery of the mold sections are located in reverse relation to the corresponding surfaces of the wedge portions of the lugs and locking ring provided upon the outer periphery of the mold sections, so that when said rings are rotated in a manner hereinafter to be described, the respective wedge or inclined surfaces of the wedge members will be carried into and out of engagement.

It will be noted that the wedge members 23 of the outer locking ring project outwardly from the outer periphery 36 of the locking ring 18, as at 37. This permits the downwardly extending portions 14 and the flanges 15 of the lugs 12 to pass freely downwardly, past the lug 12 of the lower section, it being assumed that the locking ring 18 has been turned to such an extent as to carry the wedge or cam members 23 out of the path of the said parts 14 and 15 of the lugs 8 and 9 of the upper section. Similarly, the cam or wedge members 34 of the inner locking ring 32 extend inwardly as at 38 from the inner periphery 39 of said inner locking ring 32. This permits the downwardly extending parts 28 and the flange 29 of the lugs 10 and 11 to pass to either side of the lugs 13, when the mold sections are brought into registering relation. It will be seen that the parts 28 and 29 will pass downwardly within the inner periphery of the ring. When the locking rings 18 and 32, however, are moved relatively to each other, the cam or wedge surfaces respectively of said rings and lugs will be brought

into wedging or camming relation, whereby the meeting faces of the mold sections will be tightly locked into engagement.

The outer locking ring 18 is provided with an operating handle 40 and the inner locking ring 32 is provided with an operating handle 41, said handles being located in a position whereby they may be grasped by the hands of an operator standing in front of the mold. When the handles 40 and 41 are moved toward each other, the cooperative action of the wedge members will lock the mold sections together, and when said handles are moved in an opposite direction, the mold sections will be unlocked, as has been clearly described in the foregoing specification.

By referring to Figure 2 of the drawings, it will be observed that the handle 41 extends downwardly from the inner locking ring 32, and then outwardly under the mold, so that its outer end may be readily grasped by the operator. The lower section of the mold is mounted upon trunnions 42 and 43, carried upon brackets 44 and 45 mounted upon the upright standards 46 and 47, which standards support the mold and its associated parts.

Having thus described the construction of this embodiment of my invention, the operators thereof, which should be largely obvious, is as follows:

It will be understood, of course, that the mold when in use is in a heated condition, the heating medium being steam which is continuously passed through both sections of the mold through the passageways 3. Assuming the locking rings 18 and 32 to be in unlocking positions, the upper section 2 of the mold is swung upwardly upon its point of pivotal support, whereupon the tube of unvulcanized rubber indicated at 48 may be deposited in the lower section of the mold. As has already been described, the bore of the lower section of the mold is considerably larger in cross-sectional area than the upper section thereof. This is an important element of the invention, by reason of the fact that the unvulcanized rubber tubes are in a very sticky or "tacky" condition, and the molds being heated, it is essential that the major portion of the tube rest in the mold before the upper section is closed down thereon, otherwise the heat of the mold is liable to soften the unvulcanized rubber to such an extent that portions of the tube will fall upon the upper face 26 of said lower section, whereupon when the upper section is swung downwardly thereon, those portions of the tube will be pinched between the meeting faces of the mold sections, and the tube will be found to have been destroyed. Therefore, by increasing the size of the bore of the lower section of the mold with relation to the bore of the

upper section of the mold, an important object of this invention is attained.

Assuming now the unvulcanized tube to have been deposited in the lower section of the mold, the upper section is then swung downwardly until the meeting faces 26 and 27 of the mold sections are brought into contact. As has already been explained, the loose motion provided in the pivotal mounting of the mold sections permits their meeting faces to be brought into intimate contact with their whole force, without placing any strain whatever upon the pivotal mounting parts of the mold sections. When this operation has been accomplished, the operator grasps the handles 40 and 41, and swings them toward each other, whereupon the cam or wedging faces of the rings and lugs already explained, are brought into camming or wedging relation and the mold sections are tightly locked together. It will be understood, of course, that steam is at all times being passed through the passageways 3 of the mold sections, whereby the mold sections are always maintained at a constant vulcanizing temperature.

It will accordingly be seen that I have provided a construction well adapted to attain, among others, all the ends and objects above set forth, in an exceedingly efficient manner. As already explained, the locking and unlocking together of mold sections, such as disclosed herein, has been a rather tedious operation, requiring the use of cam screws or swinging clamping members. By means of the present construction, both the locking and unlocking operations are accomplished almost instantaneously. This is most important, inasmuch as already explained, the unvulcanized rubber tube placed in the heated section, commences to wilt, due to the influences of the heat, almost as soon as it is inserted therein.

It will be understood that various changes may be resorted to in the form, construction and arrangement of the several parts without departing from the spirit and scope of my invention; and hence, I do not intend to be limited to the details herein shown and described except as they may be included in the claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In apparatus of the class described, in combination, a pair of pivotally mounted mold sections, each of which is provided with a plurality of inwardly and outwardly extending lugs, certain of said lugs being provided with cam or wedge surfaces, a locking ring located between said lugs and having cam or wedge members adapted to co-operate with the cam or wedge surfaces to lock the mold sections together.

2. In apparatus of the class described, in

combination, a pair of pivotally connected mold sections, each mold section being provided with a set of outwardly and inwardly extending lugs, one set of said lugs being provided with wedge or cam members, a pair of locking rings, each of which is provided with a plurality of cam or wedge members mounted for rotation upon the other set of said lugs, said lugs and said ring being so relatively located when the mold section is closed, that a rotative movement of said rings will carry the wedge or cam members thereof into co-operative relation with the cam members of said lugs, whereby said mold sections will be locked together.

3. In apparatus of the class described, in combination, a pair of pivotally connected mold sections, each mold section being provided with a set of outwardly and inwardly extending lugs, one set of said lugs being provided with wedge or cam members, a pair of locking rings, each of which is provided with a plurality of cam or wedge members mounted for rotation upon the other set of said lugs, said lugs and said ring being so relatively located when the mold section is closed, that a rotative movement of said rings will carry the wedge or cam members thereof into co-operative relation with the cam members of said lugs, whereby said mold sections will be locked together, and an operating arm extending outwardly from each of said locking rings.

4. In apparatus of the class described, in combination, a plurality of mold sections pivotally connected so that they may swing relatively to each other, a plurality of pairs of lugs mounted upon the upper section of the mold, a plurality of lugs mounted upon the lower section of the mold, the lugs upon said sections being so relatively located that when said sections are in closed positions, the lugs upon the lower section will be received between the lugs of the upper section, the lugs of each section being channeled, the lugs upon the lower section within the channels therein being provided with wedge or cam members, a ring mounted for rotation within the channel of the lugs upon the upper section, said ring being provided with a plurality of wedge or cam faces, adapted

when said ring is rotated, to engage with the cam or wedge members of the lugs upon the lower section, whereby said mold sections will be locked together, and means for rotating said ring.

5. In apparatus of the class described, in combination, a pair of pivotally mounted mold sections, one of said mold sections being provided with laterally extending lugs, the other of said mold sections having outwardly and downwardly extending flanged lugs, said lugs having wedge-engaging surfaces respectively upon their lower and upper faces, and a ring having wedge portions located between said lugs, the wedge portions of which are adapted to engage said wedge surfaces to lock the mold sections together.

6. In apparatus of the class described, in combination, a lower horizontally disposed mold section having laterally extending flanges, an upper horizontally disposed mold section having laterally downwardly and inwardly extending portions, said last named portions being provided with upwardly faced wedge-engaging surfaces, the flanges upon said first named mold section having downwardly faced wedge-engaging surfaces, and a locking ring interposed between said mold sections and provided with a plurality of wedge members adapted to engage with said wedge surfaces, whereby to lock the sections together.

7. In apparatus of the class described, in combination, a pair of mold sections, each of which is provided with a plurality of inwardly and outwardly extending lugs, certain of said lugs being provided with cam or wedge surfaces, inner and outer locking rings located between said lugs and having cam or wedge surfaces adapted to cooperate with the cam or wedge surfaces on the lugs to lock the mold sections together, the cam or wedge surfaces on the outer ring being slanted oppositely to the cam or wedge surfaces on the inner ring, whereby opposite rotative movement of said rings will draw the mold sections together.

In testimony whereof, I affix my signature.

WALTER L. FAIRCHILD.