

June 30, 1931.

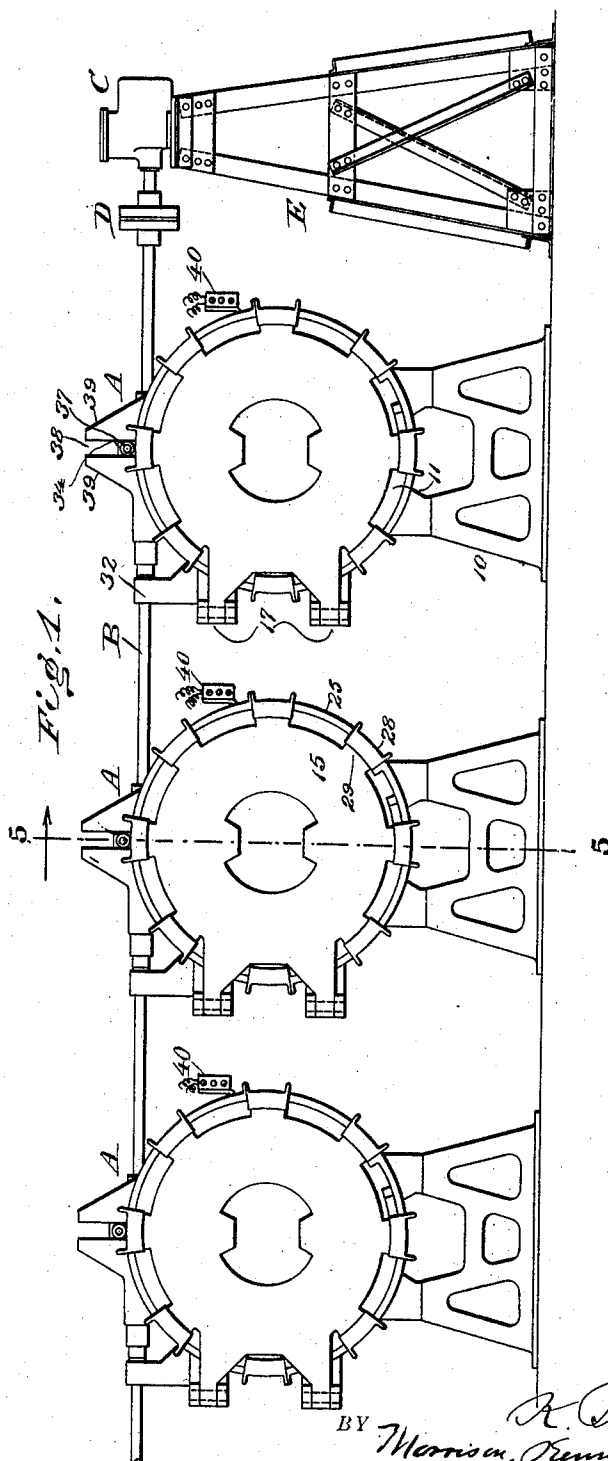
K. B. KILBORN

1,812,792

VULCANIZING APPARATUS

Filed July 10, 1928

4 Sheets-Sheet 1



INVENTOR
K. B. Kilborn
BY *Morrison, Remick & Campbell*
ATTORNEYS.

June 30, 1931.

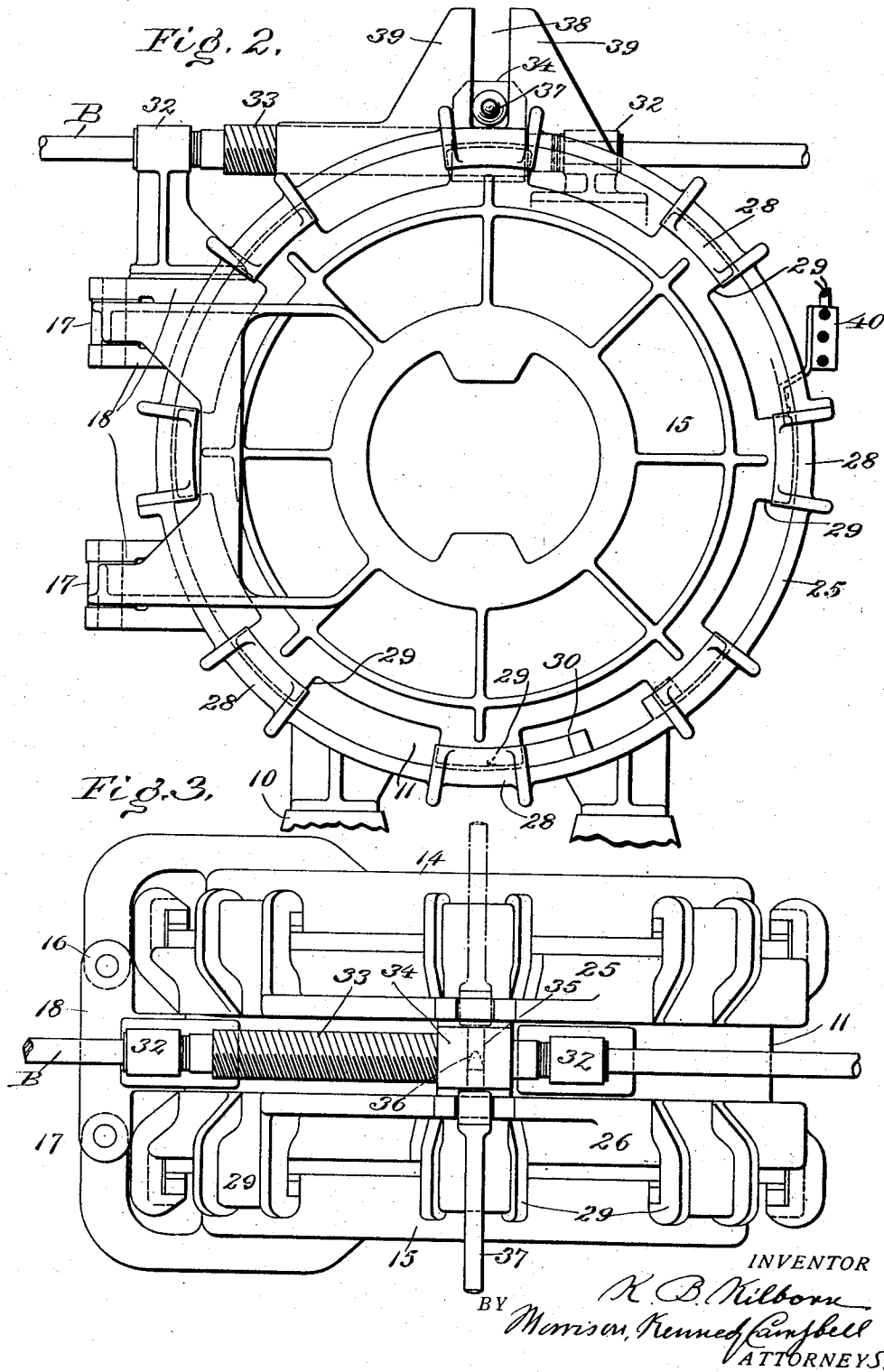
K. B. KILBORN

1,812,792

VULCANIZING APPARATUS

Filed July 10, 1928

4 Sheets-Sheet 2



June 30, 1931.

K. B. KILBORN

1,812,792

VULCANIZING APPARATUS

Filed July 10, 1928

4 Sheets-Sheet 3

Fig. 4.

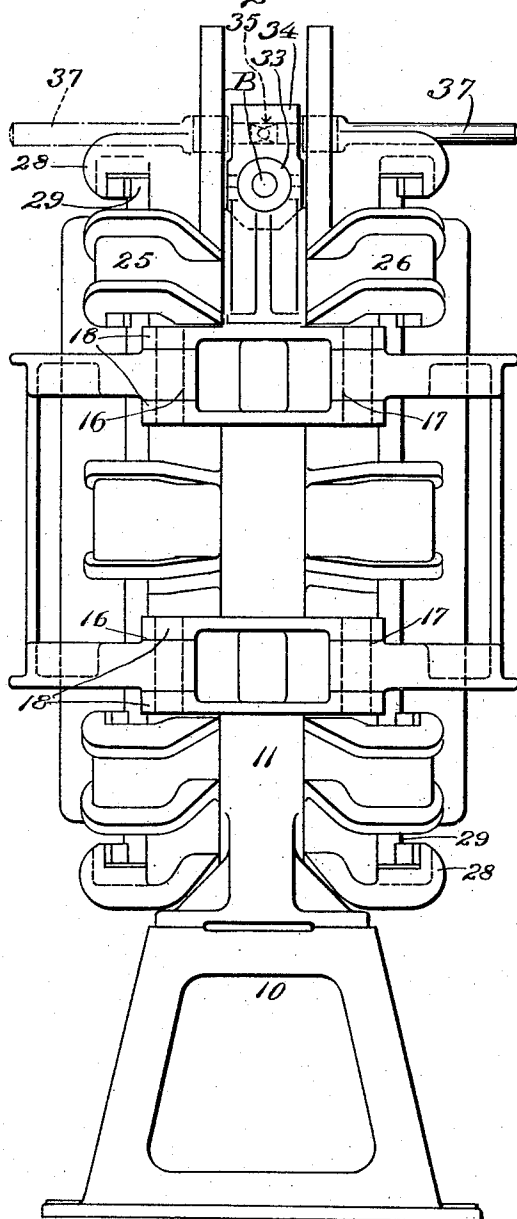
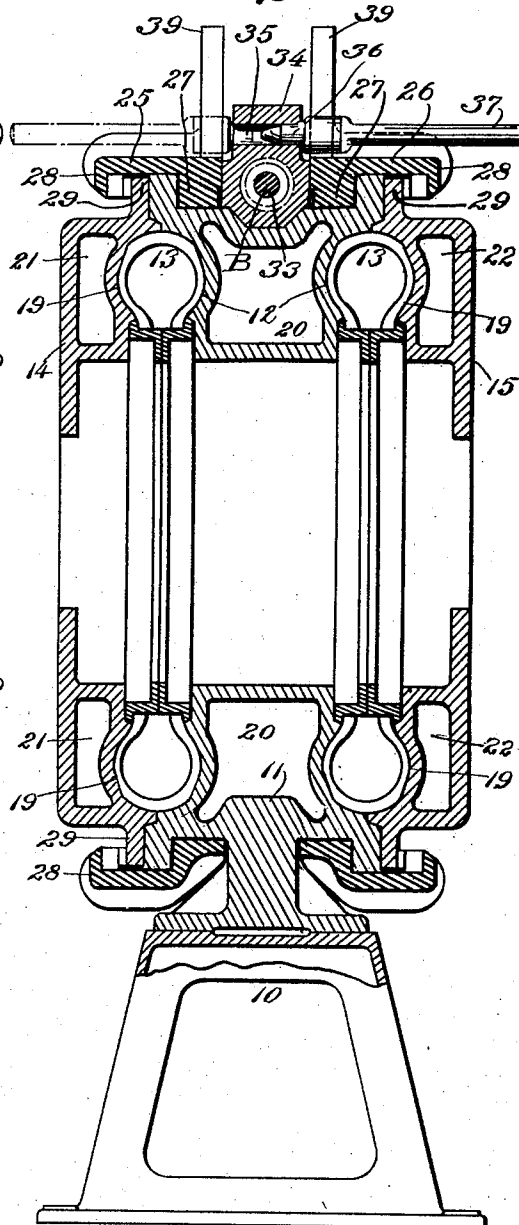


Fig. 5.



INVENTOR
K. B. Kilborn
BY Morrison, Kennedy & Campbell
ATTORNEYS.

June 30, 1931.

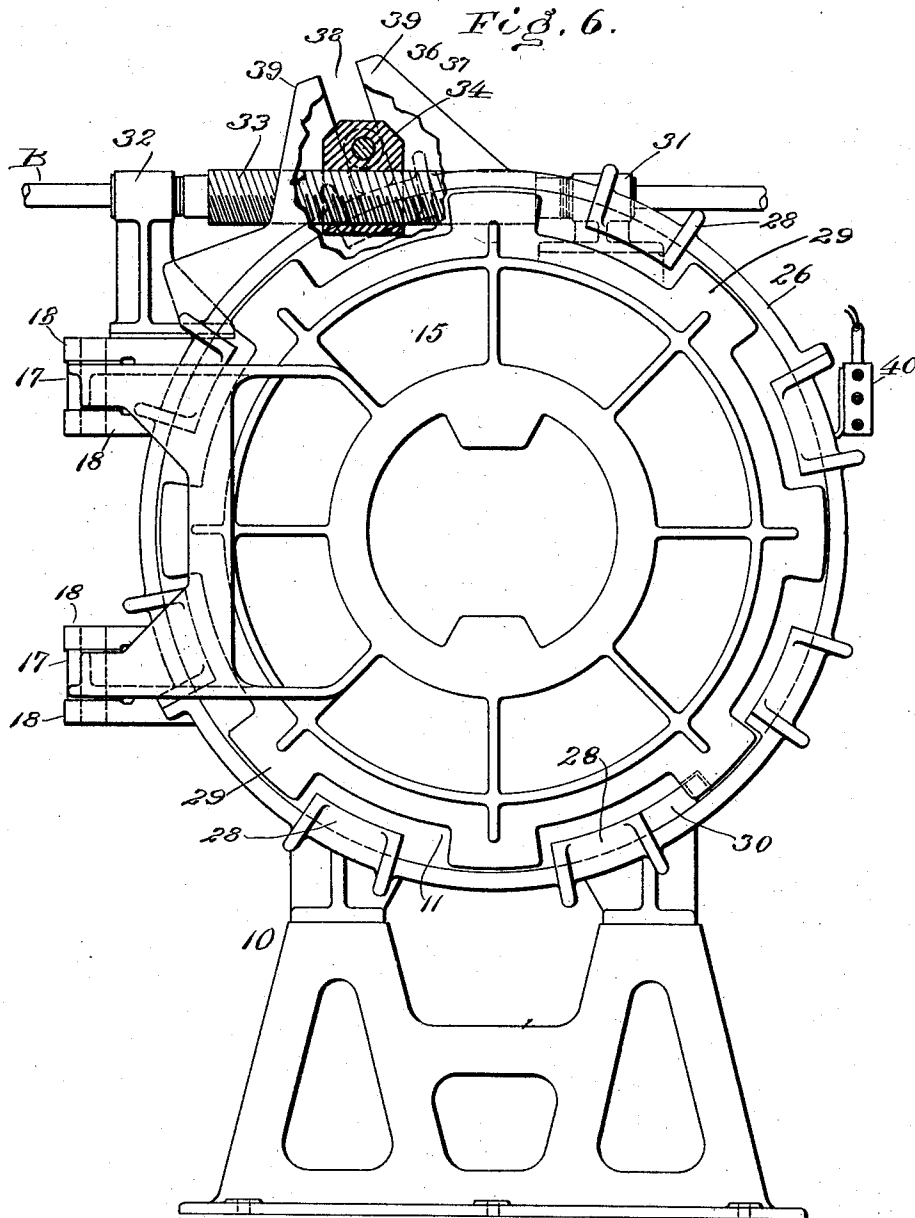
K. B. KILBORN

1,812,792

VULCANIZING APPARATUS

Filed July 10, 1928

4 Sheets-Sheet 4



INVENTOR
K. B. Kilborn
BY *Morrison, Kennedy & Campbell*
ATTORNEYS.

UNITED STATES PATENT OFFICE

KARL B. KILBORN, OF FAIRLAWN, OHIO, ASSIGNOR TO SEIBERLING RUBBER COMPANY,
A CORPORATION OF DELAWARE

VULCANIZING APPARATUS

Application filed July 10, 1928. Serial No. 291,676.

This invention relates to vulcanizing apparatus, such as sectional vulcanizing molds, and refers more particularly to mechanisms for locking and unlocking the mold sections.

5 The invention is primarily designed for use in or with vulcanizers of the "watch-case" or "book" types, such as are frequently employed in the manufacture of pneumatic tires, inner tubes and the like. Vulcanizers
10 of this type comprise two or more hingedly connected steam jacketed mold sections which receive between them the tires or other articles to be vulcanized, and which are equipped with means whereby they may be
15 selectively locked and unlocked, such means usually consisting of a rotatable ring encircling the mold sections and formed about its periphery with a plurality of wedges or cam surfaces adapted to cooperate with similar
20 wedges or cam surfaces on one of the mold sections. In order to reduce the manual effort required in locking and unlocking the individual molds, it is customary to employ some kind of power mechanism for rotating
25 the locking rings, it being the common practice to provide a separate power unit for each ring. (See Fleiter Patent No. 1,658,376). As a result of this old practice, when a whole battery of vulcanizers is
30 installed (which is the case in most factories, where one attendant is required to look after a number of vulcanizers) the initial cost of installation is very high, due to the duplication of the power units required for operating
35 the locking rings of the various molds. Furthermore, the duplicated power units increase the amount of floor space required for each vulcanizer.

These and other objectionable features
40 of the prior art are overcome by the present invention which contemplates the provision of a single power unit for use in connection with a plurality of vulcanizing units, means being provided for connecting any one or all
45 of the locking rings of such vulcanizing units to said single power unit, whereby they may all be rotated in unison or individually, or in any other desired order. In the preferred
50 embodiment illustrated, the power is supplied by a reversible electric motor which

drives a shaft extending tangentially past a row or line of vulcanizing molds, and adjacent each mold, the power shaft is provided with a nut which, when coupled to the corresponding locking ring, is held against rotation and is thus caused to move forward and
55 backward as the shaft rotates in one direction or the other, such movement of the nut causing rotation of the locking ring to locking or unlocking position according to the
60 direction of movement. By means of simple coupling devices, the connections between the several nuts and locking rings can be made or broken at the will of the attendant, and with the aid of suitable control switches
65 for the motor disposed at or adjacent to each vulcanizing unit, the attendant can readily control the movements of the locking rings as he opens or closes one vulcanizer after another. If desired, the power for the operating
70 unit may be supplied by a pressure cylinder instead of from an electric motor, and in that case the power shaft may be made to reciprocate rather than rotate.

The foregoing and other objects, features,
75 and advantages of the invention will be fully appreciated from the following description in connection with the accompanying drawings wherein one form of the invention has been shown by way of illustration, and
80 wherein

Fig. 1 is a front elevation of a battery of vulcanizers connected to a single power mechanism in accordance with the invention;

Fig. 2 is an enlarged elevation of one of
85 the vulcanizing units per se with the locking ring in locking position;

Fig. 3 is a top plan view thereof;

Fig. 4 is an edge view of the unit shown in
90 Figs. 2 and 3;

Fig. 5 is a vertical transverse sectional view on line 5—5 of Fig. 1; and

Fig. 6 is an elevation similar to Fig. 2 but showing the ring in unlocking position.

In Fig. 1, there is illustrated a plurality of
95 vulcanizing units A (of which there may be any desired or convenient number), all arranged in a straight row or line and adapted for connection with an actuating member B, by which they may be locked or unlocked,
100

either independently or collectively from a single power device C. Any other battery formation is, of course, within the spirit of the invention, and furthermore other specific types of molds and power units may be employed.

In the illustrated embodiment, the actuating member B is in the nature of a shaft which extends tangentially past the upper sides of the vulcanizing units A and is adapted to be rotated in opposite directions by the power unit C through a flexible coupling D. The power unit, in this embodiment, is a reversible electric motor which is preferably connected to the shaft through suitable speed-reducing gears not shown. A structural steel frame E serves as a support for the power unit C.

The vulcanizing units A have been illustrated as of the "watch-case" heater type, and since these units are all alike, a detailed description of one only will be sufficient for a clear understanding of the invention. By referring particularly to Figs. 2 to 6 inclusive, it will be seen that each of the units A comprises a pedestal or base 10, to the upper side of which is secured a central or stationary mold section 11, which latter is of annular form and provided in its opposite faces with molding grooves 12 for the reception of the tires 13 or other articles to be molded. Swinging mold sections 14 and 15 are hingedly mounted at 16 and 17, respectively, on spaced arms 18 which extend outwardly from the stationary mold section 11, and these swinging mold sections are provided on their inner faces with molding grooves 19 which, in conjunction with the grooves 12 of the central section 11, define cavities for confining the tires while they are being vulcanized. The tires are subjected to pressure by being inflated in the well known manner, and are heated by circulation of steam or the like through heating chambers or jackets 20, 21 and 22 formed in the mold sections 11, 14 and 15, respectively.

During the vulcanizing operation, the swinging mold sections 14 and 15 are firmly clamped in closed position by means of two locking rings 25 and 26, which are rotatably mounted on the stationary mold section 11 and spaced from each other at opposite sides of the central plane of the mold. These rings are maintained in position by inturned flanges 27 at their inner edges which engage shouldered or grooved portions of the mold section 11, and they are further characterized by a plurality of spaced lugs 28 which are adapted to alternately engage and disengage similarly spaced lugs 29 on the swinging mold sections 14 and 15. The spaces between the lugs 29 are greater than the width of the lugs 28 (see Fig. 6), so that when the lugs are disengaged, the swinging sections 14 and 15 can be swung outwardly away from

the fixed section 11 to open the mold. In Figs. 1 and 2, the mold is shown closed with the locking rings in their locking positions, whereas in Fig. 6 the locking rings are shown as having been turned to their unlocking positions.

The mutually engaging surfaces of the lugs 28 and 29 are preferably beveled in the usual manner whereby to effect the final tight closing or clamping of the molds. One of the lugs 28 of each locking ring is extended, as shown at 30, to a plane in back of the mating lug 29 on the swinging mold section and is beveled in such a manner as to effect the initial opening movement of the swinging mold section as the locking ring is turned to its unlocking position. Thus, in the unlocking movement of the rings, the lugs 28 are first moved to positions in line with the spaces between the lugs 29, whereupon by a slight further movement of the rings the longer lug portions 30 engage the inner surfaces of the adjacent lugs 28 and break the molds open.

The shaft B is supported by pairs of thrust bearings 31 and 32 mounted in spaced relation on the respective fixed mold sections 11, and is provided with screws 33 adjacent each vulcanizer unit. These screws 33 are disposed between the locking rings 25 and 26 of the several vulcanizer units and are fitted with nuts or travelers 34 which slide in guideways formed in part (see Fig. 5) by the two locking rings, whereby they are held against rotation and caused to reciprocate as the shaft B is driven. The upper side of each nut 34 has a transverse bore 35 for the reception of the reduced inner end 36 of a detachable coupling pin 37 which passes through and has sliding movement within a radial slot 38 formed in a lug 39, there being one such lug integral with or secured to each of the locking rings. Thus, the nut 34 of each unit operates between two lugs 39, one on each locking ring, and to either of which it may be selectively connected by the detachable coupling pin 37.

From the foregoing, it will be clear that either one of the rings 25 or 26 of any one of the units A, or all of them together, may be easily connected to the power shaft B and moved thereby to locking or unlocking position as desired. Suitable remote control means 40, such as electric switches, valves, or the like, are provided adjacent each unit A so that the attendant can readily start, stop, or reverse the motor C from any one of his stations in the battery.

In the operation of the improved apparatus, the attendant may begin with the unit A at one end of the line and place an unvulcanized tire 13 in the cavity 12 of one side of the heater, whereupon he will swing the cover section 14 into the plane of the locking ring 25. Then, by proper manipulation of

the control means 40, he causes the shaft B to be rotated in the appropriate direction and, through the medium of the corresponding screw 33, nut 34, and inserted coupling pin 37, effects the rotation of the ring 25 to its locking position. After closing the mold, the vulcanization of the tire of course begins at once. He then removes the coupling pin 37 and proceeds to the next vulcanizer unit, where he similarly places another tire in the mold for vulcanization, continuing this procedure until he has placed all of the molds in operation at both the front and rear of the watch-case heaters. After the proper time has elapsed, the attendant returns to the first unit A and opens the mold as previously explained by the reverse rotation of the shaft B, removes the vulcanized tire, replaces it with another green tire, closes and locks up the mold, and repeats the performance at each station in turn.

The above operation is merely given to illustrate a practical and economical way of using the improved apparatus. As will have been understood, in the above described operation the locking ring of each mold in turn is connected to the single power unit for independent actuation, first to lock and then to unlock the mold sections, the remaining molds being disconnected from the power unit at the time. It is obvious, of course, that the locking rings of a plurality of molds could be connected to the power unit for simultaneous operation, either to lock or unlock the molds, if the conditions of use made that desirable or necessary. Indeed, the flexibility of the apparatus is such that any selected one or group of molds may be locked or unlocked singly or collectively according to the connection of the locking rings to the common power unit.

The invention is of course susceptible of numerous modifications in the details of construction and arrangement of parts, and the right is herein reserved to make such changes as fall within the scope of the appended claims without departing from the spirit of the invention.

In addition to its function of locking and unlocking the associated mold, each locking ring may be made by its rotation to swing the hinged mold section to its open and closed positions, as for example in the manner illustrated in Patent No. 1,658,376 above referred to, thereby increasing the range of action of the single power unit.

Having thus described my invention, what I claim is:

1. In combination with a plurality of vulcanizing units, each having a rotatable locking ring, a power-driven shaft extending past all of said vulcanizing units, screw-threaded elements mounted on and reciprocable by the shaft adjacent each vulcanizing unit, and

means for connecting said screw-threaded elements to the adjacent locking means.

2. In combination with a plurality of vulcanizing units, each having a rotatable locking ring, a power-driven shaft extending past all of said vulcanizing units, reciprocatory elements mounted on and actuatable by the shaft adjacent each vulcanizing unit, and means for connecting said units to the adjacent locking rings.

3. In combination with a plurality of vulcanizing units, each provided with rotatable locking means, a power-driven shaft extending past all of said vulcanizing units, reciprocatory means mounted on and actuatable by the shaft, and means for selectively connecting said reciprocatory means to the locking means.

4. In combination with a plurality of vulcanizing units, each having a rotatable locking ring, a reversible power-driven shaft extending tangentially past all of said vulcanizing units, screw-threaded elements reciprocable by the shaft adjacent each vulcanizing unit, and means for detachably connecting said screw-threaded elements to the adjacent locking rings.

5. A vulcanizer of the class described comprising a fixed mold section, a movable mold section hinged thereto, a locking ring rotatable about one of the mold sections and provided with lugs for engagement with portions of the other mold section, a rotatable screw disposed tangentially with reference to the locking ring, a nut threaded on the screw and held against rotation whereby to translate rotary motion into rectilinear motion, and means connecting the nut with the locking ring whereby to move the same to locking and unlocking positions.

6. A vulcanizer of the class described comprising a substantially upright fixed mold section having mold cavities in its opposite faces, two swinging mold sections hinged thereto, locking rings rotatable about the fixed mold section and provided with lugs for locking engagement with portions of the swinging mold sections, a power-driven screw tangentially disposed between the locking rings, and means actuated by said screw to turn the rings to locking and unlocking positions.

In testimony whereof, I have affixed my signature hereto.

KARL B. KILBORN.