

W. J. STARK.
 APPARATUS FOR REPAIRING PNEUMATIC TIRES.
 APPLICATION FILED NOV. 15, 1907.

919,391.

Patented Apr. 27, 1909.

3 SHEETS—SHEET 1.

Fig. 1

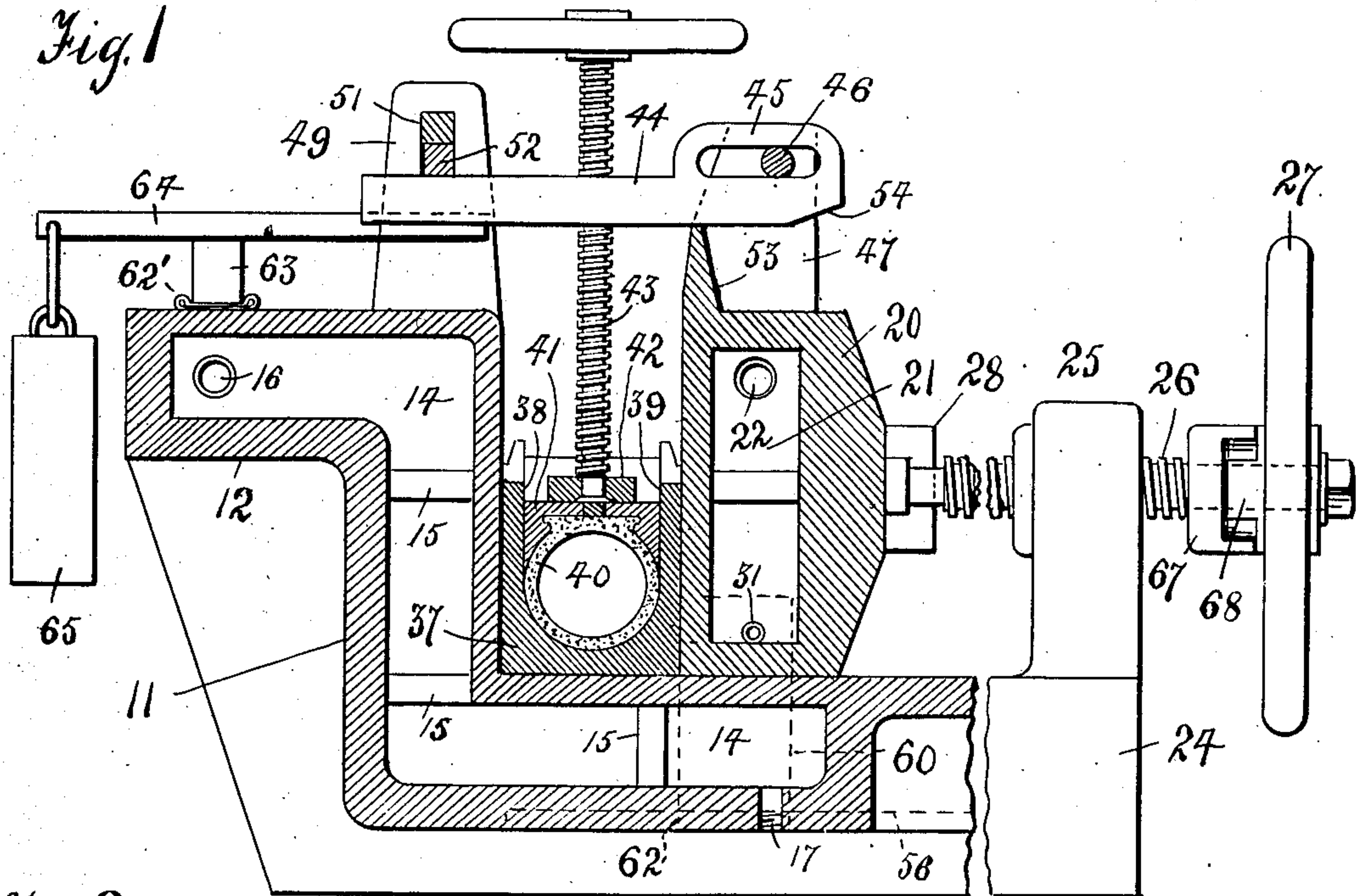
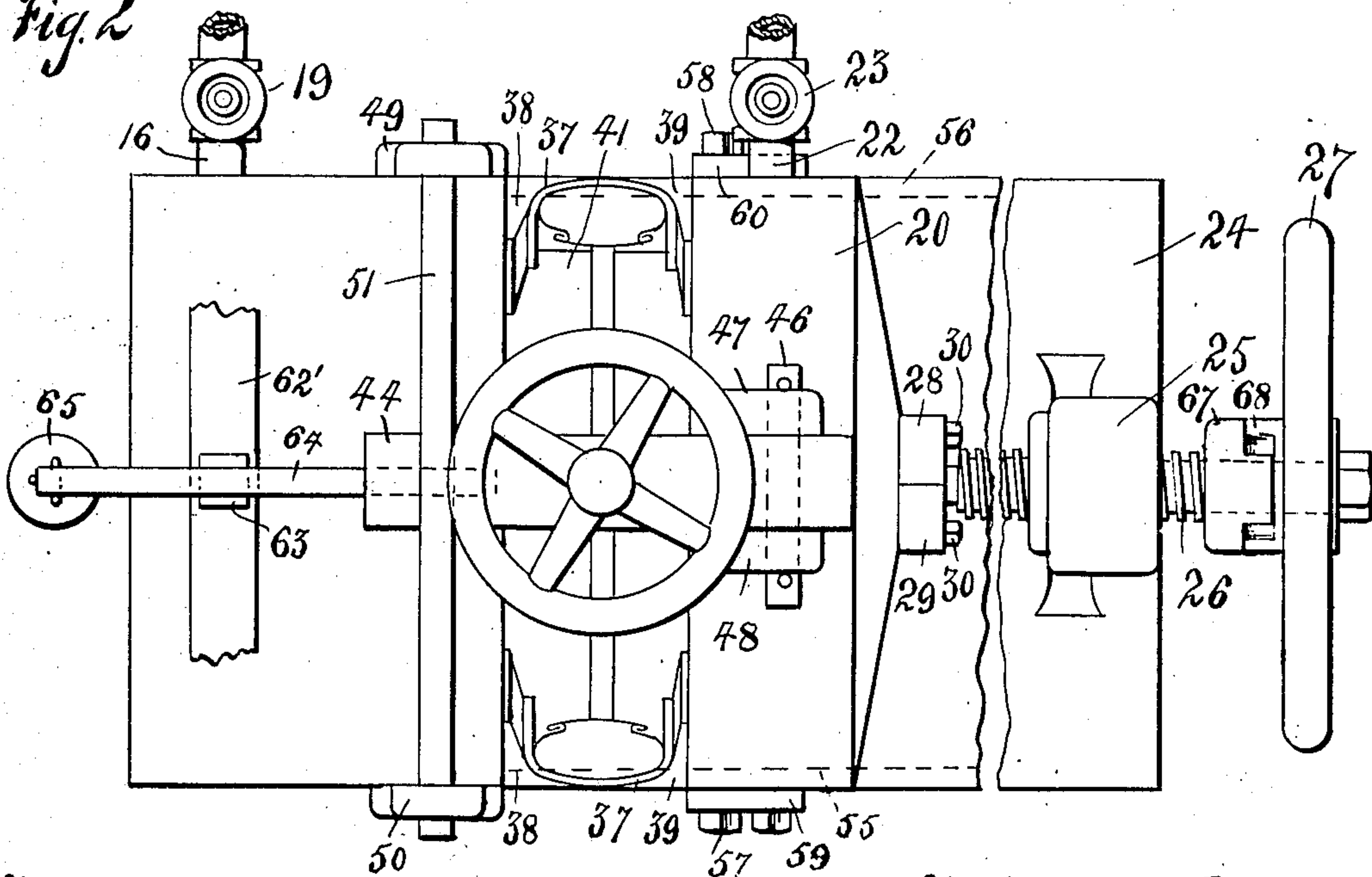


Fig. 2



Witnesses

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3 SHEETS—SHEET 3.

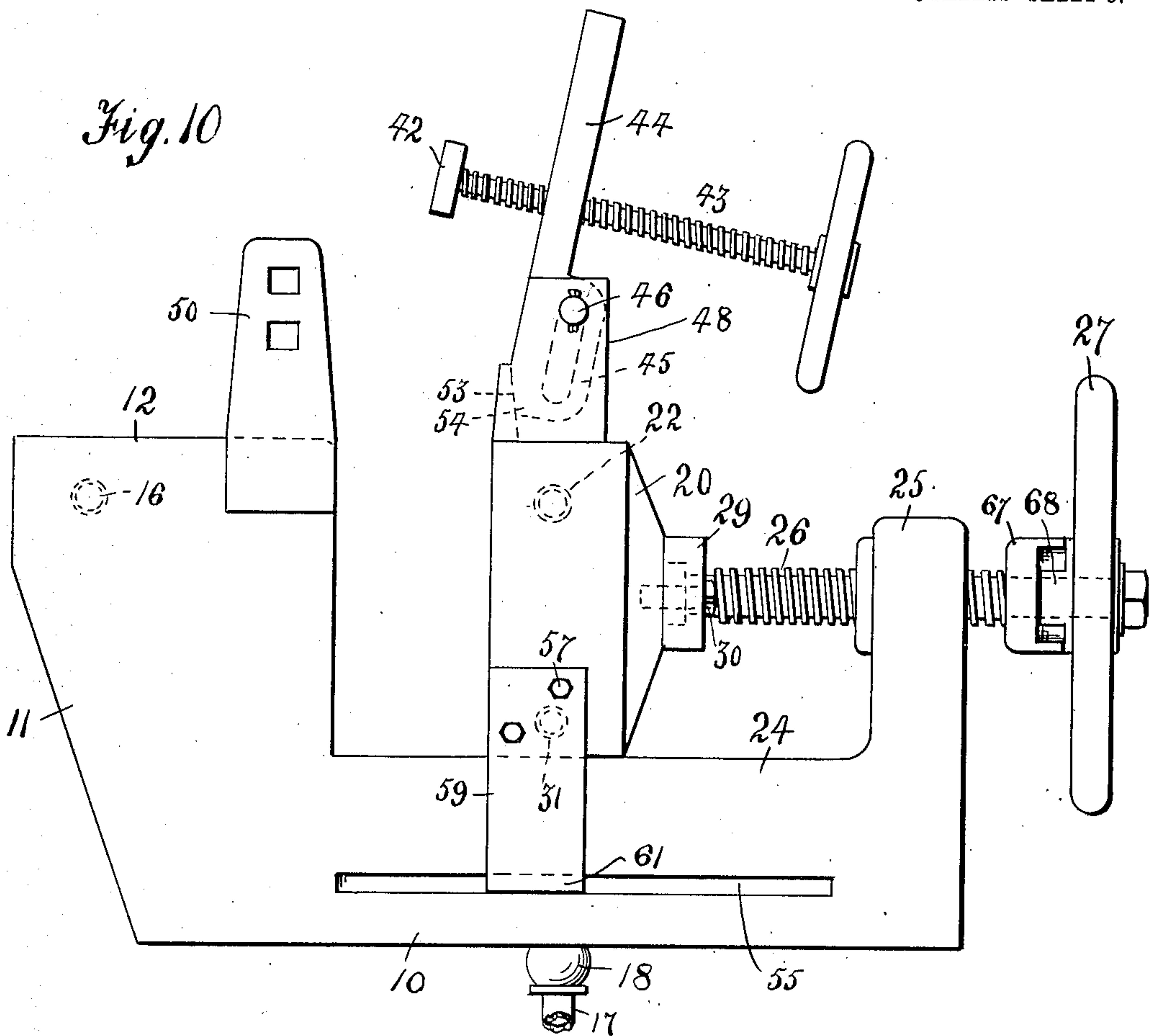


Fig. 11

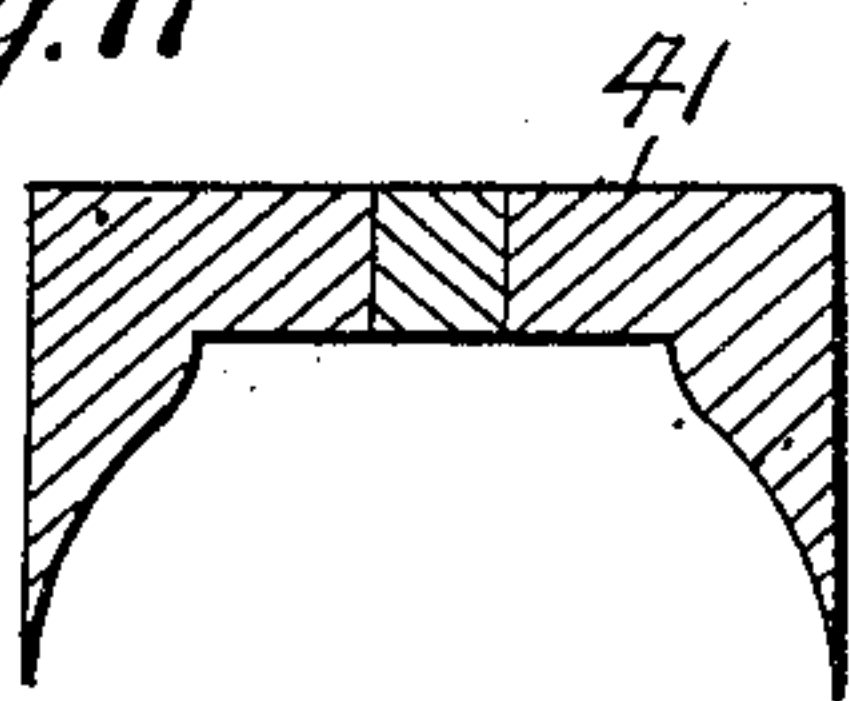


Fig. 12

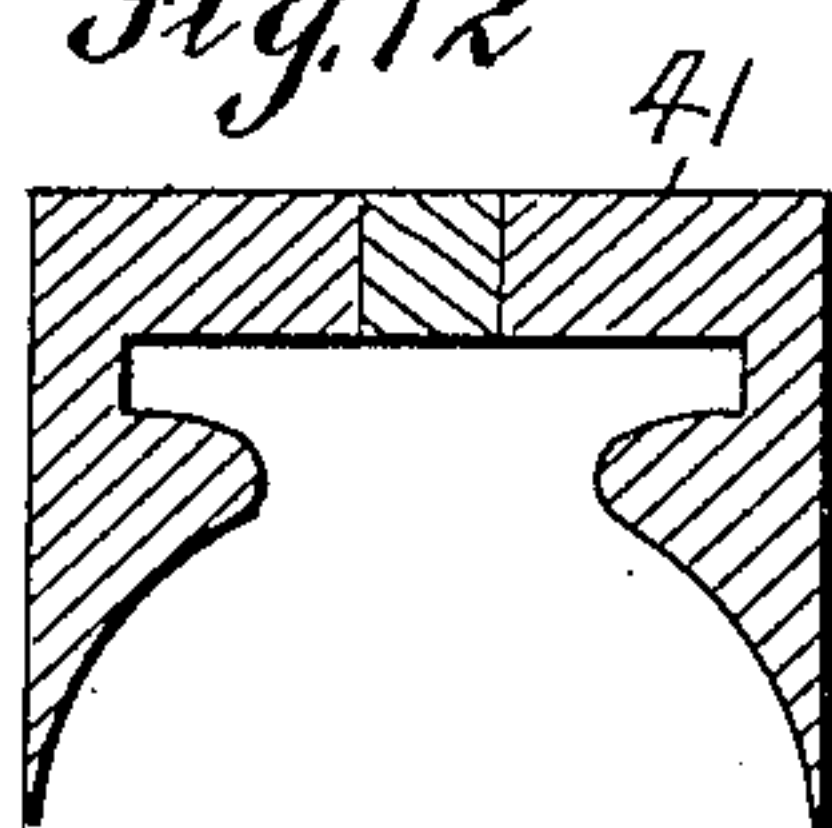
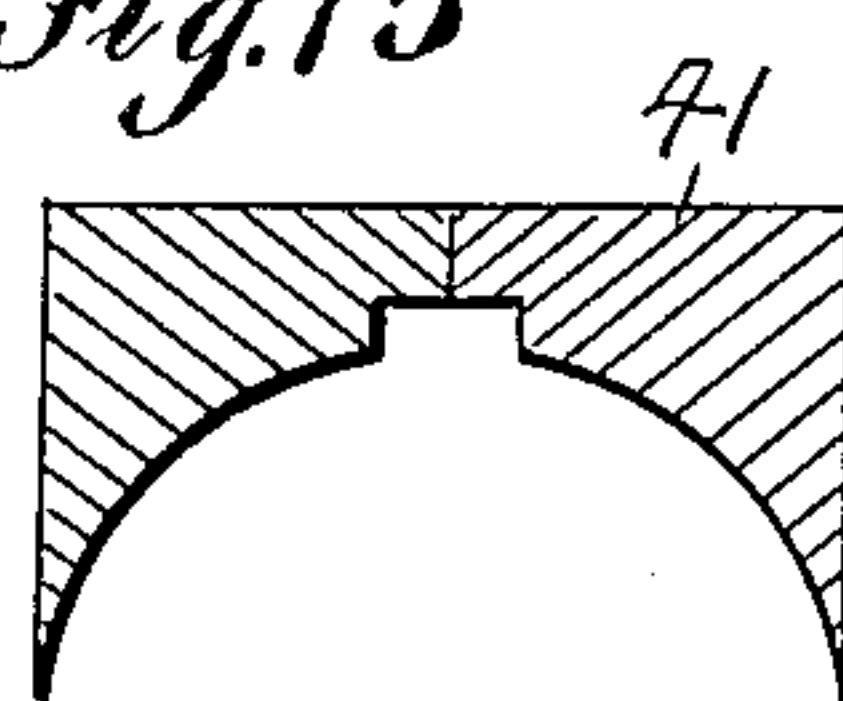


Fig. 13



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM J. STARK, OF SALT LAKE CITY, UTAH.

APPARATUS FOR REPAIRING PNEUMATIC TIRES.

No. 919,391.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed November 15, 1907. Serial No. 402,335.

To all whom it may concern:

Be it known that I, WILLIAM J. STARK, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake and State of Utah, have invented certain new and useful Improvements in Apparatus for Repairing Pneumatic Tires, of which the following is a specification.

This invention relates to an apparatus employed in repairing punctures and breaks in pneumatic tires and also for replacing or restoring the valve tubes, and has for its object to improve the construction and increase the efficiency and utility of devices of this character.

With these and other objects in view, the invention consists in certain novel features of construction, as hereafter shown and described and specifically pointed out in the claims.

In the drawings employed for illustrating the invention is shown the preferred form of embodiment of the invention, and in the drawings thus employed, Figure 1 is a longitudinal sectional elevation of the improved apparatus complete. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation with the main pressure screw in section and the hand operating wheel removed. Fig. 4 is a longitudinal section of the form of mold employed when repairing an automobile tire. Fig. 5 is a section on the line 5—5 of Fig. 4. Fig. 6 is a longitudinal section of the form of mold employed in repairing an ordinary carriage tire. Fig. 7 is an end elevation of the mold shown in Fig. 5. Fig. 8 is a longitudinal section of the form of mold employed in repairing bicycle tires. Fig. 9 is an end elevation of the form of mold shown in Fig. 8. Fig. 10 is a side elevation of the improved apparatus in open position. Figs. 11, 12 and 13 are sectional views of forms of dies employed upon various constructions of tires.

The improved apparatus comprises a hollow base 10 having a vertical hollow portion 11 and a horizontal portion 12 communicating with the upper end of the vertical portion 11. The hollow interior 14 of the three portions 10—11—12 forms a continuous steam chamber, as shown, and is strengthened by transverse ribs 15, to enable the device to withstand the pressure to which it will be subjected. A steam pipe 16 leads into the steam chamber 14 at its upper portion and a drain pipe 17 leads from the steam chamber 14 at its lowest point, the drain pipe having a

controlling valve 18, and the steam pipe 16 is provided with a controlling valve 19.

Slidably disposed upon the hollow base 10 is a hollow movable member 20, the interior portion 21 of the movable member forming a steam chamber, and into which a steam pipe 22 leads and provided with a controlling valve 23.

The base 10 is formed with an extension 24 from which a standard 25 rises and suitably threaded to receive a relatively large screw 26, the screw bearing against the rear side of the movable member 20 and provided with a hand operating wheel 27. The inner end of the screw 26 is swiveled in a two-part block 28—29 secured by bolts 30 to the rear of the movable member 20. By this means it will be obvious that the rotation of the screw 26 will move the movable member 20 toward or away from the vertical portion 11 of the base. The movable member 20 is provided with a drain pipe 31 leading from its lower portion and provided with a controlling valve 32. The steam pipes 16 and 22 lead into a main supply pipe indicated at 33, the pipe 22 being provided with universal couplings 34—35, to enable the steam pipe 22 to be moved with the movable member 20. The drain pipe 31 is also provided with a suitable universal coupling 36 for the same purpose. By this means it will be obvious that steam may be applied to either the chambers 14 and 21 separately or at the same time, as required, by simply manipulating the controlling valves 19—23, and the water of condensation drained from the steam chambers when required through the drain pipes 17—31 by simply closing the steam valves and opening the valves 18—32.

The mold portion 37 of the apparatus is located upon the base 10 and between the vertical portion 11 and the movable member 20, and is formed with vertical sides 38—39 and conforming to the lower portion of the tire represented at 40, the mold being formed in curved shape to conform to the radius of the tire, as represented in Figs. 4, 6 and 8.

The die portion of the apparatus is represented at 41 and placed between the spaced sides 38—39 of the mold, and conforms interiorly to the upper portion of the tire, as shown in Figs. 1, 5, 11, 12 and 13. Bearing upon the die 41 is a plate 42 in which a screw 43 is swiveled. The screw 43 is threaded through a bar 44 provided with a longitudinal slotted projection 45 at one end, the slot

fitting over a pin 46 extended transversely through the spaced standards 47—48 rising from the upper end of the movable member 20. Rising from the vertical portion 11 of the base are spaced standards 49—50, preferably integral therewith; and provided with transverse apertures through which bars 51—52 extend, the threaded slotted arm 44 extending at one end beneath the bars 51—52. By this means it will be obvious that the bars 51—52 and the pin 46 co-act to support the threaded member 44, and thus permit the screw 43 to be employed as a pressure element upon the die 41, which is of the "clencher" type.

Extending between the standards 47—48 is a stop element 53 bearing beneath the bar 44 when the latter is in operative position and with its rear side inclined to receive an inclined portion 54 upon the slotted end of the bar 44 when the latter is in its inoperative position, as shown in Fig. 10, and thus enable the bar 44, with its screw 43 and plate 42, to assume a backwardly inclined position and thus be out of the way to enable the tires, molds and dies to be inserted into or removed from the apparatus.

Formed in the opposite sides of the base 10 are longitudinal guide ways 55—56, and rigidly connected to the sides of the movable member 20, as by bolts 57—58, are anchor plates 59—60, the lower terminals of the anchor plates having lateral offsets 60—61, fitting into the channels 55—56. By this means the member 20 is movably connected to the base 10, and effectually prevented from displacement therefrom by the anchor plates. By this simple means it will be obvious that any size of mold may be supported between the members 10—11—20, and that any form of die may also be employed in connection with the apparatus, so that any of the various forms and sizes of tires may be supported therein and repaired, as hereafter explained.

In Fig. 11 is shown the form of die which will be employed in repairing what is known as the "Dunlap" or flat base tires; in Fig. 12 is shown the form of die which will be employed in repairing what is known as the "Fisk" tire; and in Fig. 13 is shown the form of die which will be employed in repairing an ordinary single tube tire, and it is obvious that the mold and dies may be varied to any required extent to fit any of the various forms of tires manufactured, without departing from the principle of the invention.

In the apparatus thus described, the operation is as follows:—When a puncture or fracture or other injury occurs to a tire, the tire is removed from the wheel and a mold 37 corresponding to the form of the tire is inserted upon the base 10 and between the vertical portion 11 and movable member 20, and the screw 26 operated to

hold the mold in position, the member 44, with its screw 43, having been turned up in the position shown in Fig. 10. A suitable patch to cover the injury is provided and the tire inserted with the injured portion within the mold and the patch disposed over the puncture or other injury. A die 41 corresponding to the tire to be repaired is then inserted between the vertical side members 38—39 of the mold, the member 44 restored to its operative position with its free end beneath the bars 51—52, and the screw 43 operated to cause the plate 42 to bear with the requisite pressure upon the die. Steam is then admitted into one or both of the chambers 14—21 to produce the requisite vulcanizing temperature.

If a very high temperature is required the steam is admitted through the controlling valves into both of the chambers 14—21, but if a less temperature is required steam is admitted to the chamber 14 only, which extends along one side and beneath the mold, and if a still less temperature is required steam is admitted to the chamber 21 only, which extends along one side only of the mold. Thus the degree of temperature may be readily controlled by simply manipulating the valves 19—23, thus providing for the complete and easy control of the temperature.

If a fracture or puncture is to be repaired upon an ordinary flat tire, the tire is disposed over the upper face of the portion 12, as represented at 62' in Fig. 1, and a block 63 disposed on the tire over the patch which has been disposed over the injury; and a lever 64 inserted at one end beneath the member 44, or the bars 51—52, as the case may be, and a weight 65 suspended from the lever to provide the requisite pressure. The heat of the portion 12 of the device is thus utilized to produce the requisite vulcanization, as may be obvious.

The apparatus is simple in construction, can be cheaply manufactured and operates successfully for the purposes described, and can be readily applied to all sizes and forms of tires, as above described.

An air bag represented at 66 is inserted within the tire opposite the point where the injury occurs and inflated to provide the requisite resistance to the pressure of the die and hold the tire in position during the vulcanizing operation.

While the preferred form of the embodiment of the apparatus is herein shown and described, it will be understood that various modifications may be employed within the scope of the appended claims without departing from the principle of the invention or sacrificing any of the advantages.

The patch employed may be of any desired structure or material, but will generally be of a combination of prepared rubber and

cloth of the usual form. If the puncture or other injury is small, the tire will be turned with the injured part toward the chamber 14 or 21 as the case may be, and steam admitted to that chamber only, so that the good parts of the tire are not affected by the heat.

The hub of the hand wheel 27 is provided with one member 68 of a "knocker" or "jar" device while the other member 67 of the "knocker" or "jar" device is keyed or otherwise rigidly connected to the screw 26, so that a knock or jar may be imparted to the screw, when required, by turning the hand wheel backward to the limit of the "play" or looseness of the knocker and suddenly moving the wheel forward. By this simple means the force of the screw may be materially increased.

Having thus described the nature of the invention, what is claimed as new is:—

1. In an apparatus of the class described, a hollow base having a hollow vertical portion terminating in a hollow horizontal extension providing a continuous internal steam chamber and an extended upper heating surface, a member movable upon said base and provided with an internal steam chamber, means for adjusting said movable member toward and away from said vertical portion, means cooperating with said adjusting means to effect a knocking force to the latter and a mold device bearing upon said base and maintained against said vertical portion by said movable member.

2. In an apparatus of the class described, a hollow base having a hollow vertical portion terminating in a hollow horizontal extension providing a continuous internal steam chamber and an extended upper heating surface, a member movable upon said base and provided with an internal steam chamber, means for adjusting said movable member toward and away from said vertical portion, means cooperating with said adjusting means to effect a knocking force to the latter, a mold device bearing upon said base and maintained against said vertical portion by said movable member, and means for supplying steam independently to said steam chamber.

3. In an apparatus of the class described, a stationary steam chamber having a horizontal portion and a vertical portion at one end and a standard having a threaded aperture at the other end, a movable steam chamber disposed upon said horizontal portion, a mold device disposed upon said stationary chamber, a screw engaging the threaded aperture of said standard and bearing against said movable chamber, a head carried by said screw and provided with spaced radial lugs, a hand wheel located upon said screw with its hub provided with

spaced radial lugs extending between the lugs of said head, whereby a knocking force may be applied to the screw.

4. In an apparatus of the class described, a stationary chamber having a horizontal portion and a vertical portion, a movable steam chamber disposed upon said horizontal portion and provided with a pivot pin, a mold device including a die and disposed upon said stationary chamber, means for adjusting said movable chamber toward the vertical portion and against the mold device, a bar having a slot at one end and a threaded intermediate aperture and engaging said pin by said slot, means carried by said stationary chamber for detachably supporting the free end of said bar, and a screw engaging the threaded aperture of said bar and operating upon the die portion of said mold device.

5. In an apparatus of the class described, a stationary steam chamber having a horizontal portion and a vertical portion, a movable steam chamber disposed upon said horizontal portion and provided with spaced standards having a transverse pin and with a stop element between the standards, a bar having a slot at one end and a threaded intermediate aperture and engaging said pin by said slot, means carried by said stationary chamber for detachably supporting the free end of said bar, and a screw engaging the threaded aperture of said bar and operating upon the die portion of said mold device, said bar, when released, adapted to swing upon said pin and be engaged by said stop element.

6. In an apparatus of the class described, a stationary steam chamber having a horizontal portion and a vertical portion, said vertical portion having spaced standards with transverse apertures, stop bars detachably engaging said standard apertures, a movable steam chamber disposed upon said horizontal portion and provided with a pivot pin, a mold device including a die and disposed upon said stationary chamber, means for adjusting said movable chamber toward the vertical portion and against the mold device, a bar having a slot at one end and a threaded intermediate aperture and engaging said pin by said slot and adapted to bear beneath said stop bars at the free end, and a screw engaging the threaded aperture of said bar and operating upon the die portion of said mold device.

7. In an apparatus of the class described, a stationary steam chamber having a horizontal portion and a vertical portion, a movable steam chamber disposed upon said horizontal portion, a mold device having spaced vertical sides and disposed upon said stationary chamber, a die operating between the vertical sides of said mold, means for adjusting said movable chamber toward the

vertical portion of said stationary chamber and against the mold device, and means for imparting pressure to said die.

8. In a device of the class described, a mold having spaced vertical sides, a die disposed between said sides, means for supporting said mold against lateral movement, and means for exerting pressure upon said die.

9. In an apparatus of the class described, a stationary chamber having a horizontal portion and a vertical portion, the horizontal portion having guide ways formed therein, a movable steam chamber disposed upon said horizontal portion and provided with depending anchor plates for engagement in said guide ways to hold the movable chamber against lateral displacement and to guide it in its movement upon the horizontal portion of the stationary chamber, means for moving and adjusting said movable chamber upon said horizontal portion toward and away from the vertical portion of the stationary chamber and against the mold device, a screw cooperating with the mold device, and a bar connected to the movable chamber for sustaining said screw.

10. In an apparatus of the class described, a stationary chamber having a horizontal portion and a vertical portion, a movable chamber disposed upon said horizontal portion and provided with spaced standards having a transverse pin and a suitable element between the standards, a bar having a slot at one end and a threaded aperture intermediate its ends, said bar engaging said pin by said slot, means carried by the stationary member to support the free end of said bar, and a screw engaging the threaded aperture of said bar and operating upon the die portion of the mold device, said bar and said screw being sustained by the movable chamber when the latter is out of operative relation with the stationary chamber and the mold device with said bar in engagement with said stop.

11. In an apparatus of the class described, a hollow base having a hollow vertical portion terminating in a hollow hori-

zontal extension providing a continuous internal steam chamber and an extended upper heating surface, a member movable upon said base and provided with an internal steam chamber, the horizontal extension of said base having guide ways, elements depending from said movable member for engagement in said guide ways, means for adjusting said movable member toward and away from said vertical portion, means cooperating with the adjusting means to effect a knocking force to the latter and a mold device bearing upon said base and maintained against said vertical portion by said movable member.

12. In an apparatus of the class described, a hollow base having a hollow vertical portion terminating in a hollow horizontal extension to provide a continuous internal steam chamber and an extended upper heating surface, a member movable upon said base and provided with an internal steam chamber, means for adjusting said movable member toward and away from said vertical portion, a mold device bearing upon said base and maintained against said vertical portion by said movable member, a screw cooperating with said mold device, and means connected to the movable member to sustain said screw when the movable member is in inoperative position.

13. In an apparatus of the class described, a stationary steam chamber having a horizontal portion and a vertical portion at one end, a movable steam chamber disposed upon said horizontal portion, a mold device disposed upon said stationary chamber, means constructed and arranged to operate the movable chamber toward and away from the vertical portion of the steam chamber and said mold device, and means cooperating with the aforesaid means to effect a knocking force to the latter.

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

WILLIAM J. STARK.

Witnesses:

HYRUM BURK,

GEORGE H. PUMPHREY.