

(No Model.)

W. G. RICHARDS.
PROCESS OF CASTING STEEL WHEELS.

No. 461,962.

Patented Oct. 27, 1891.

Fig. 1

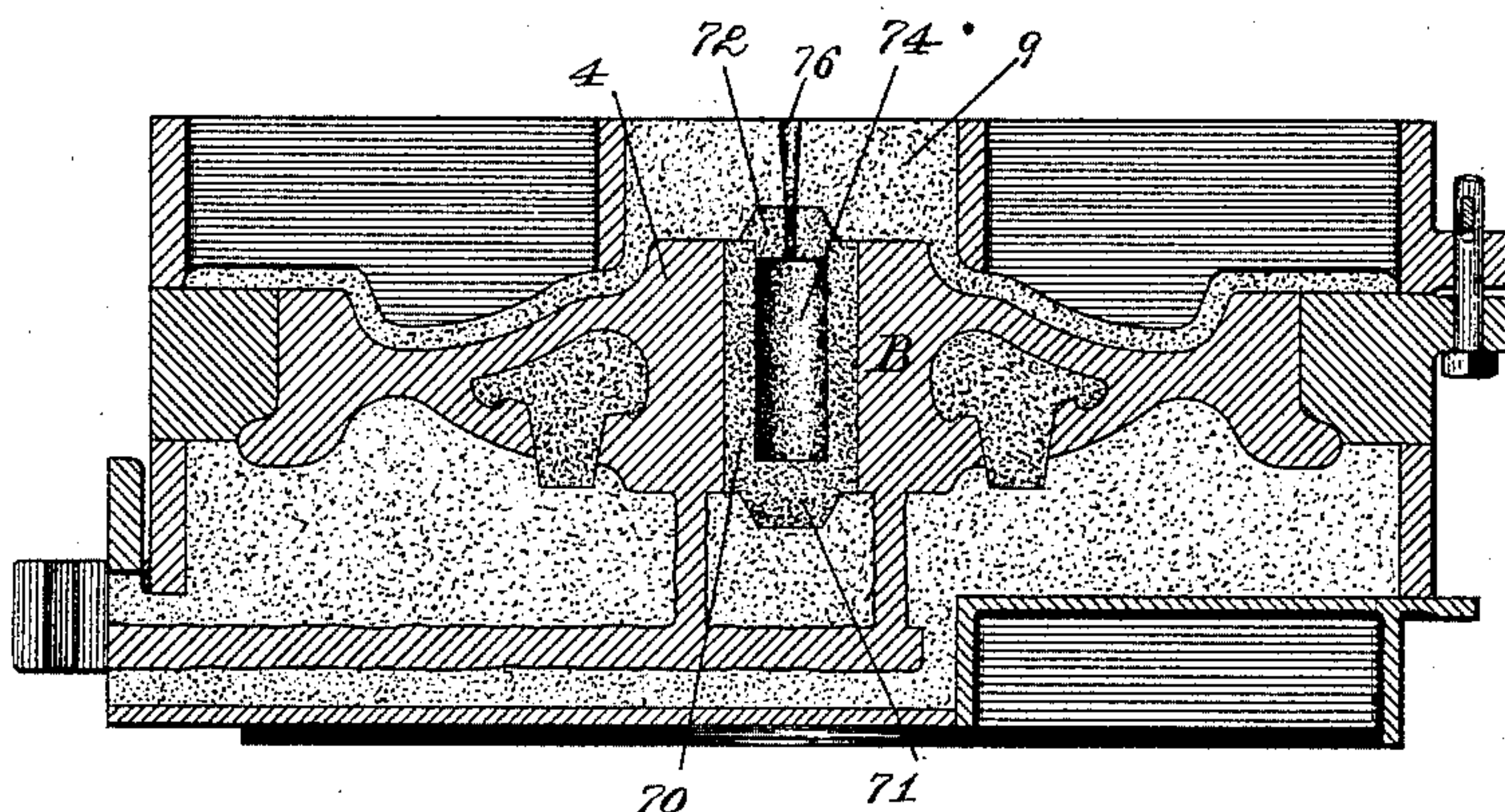


Fig. 2

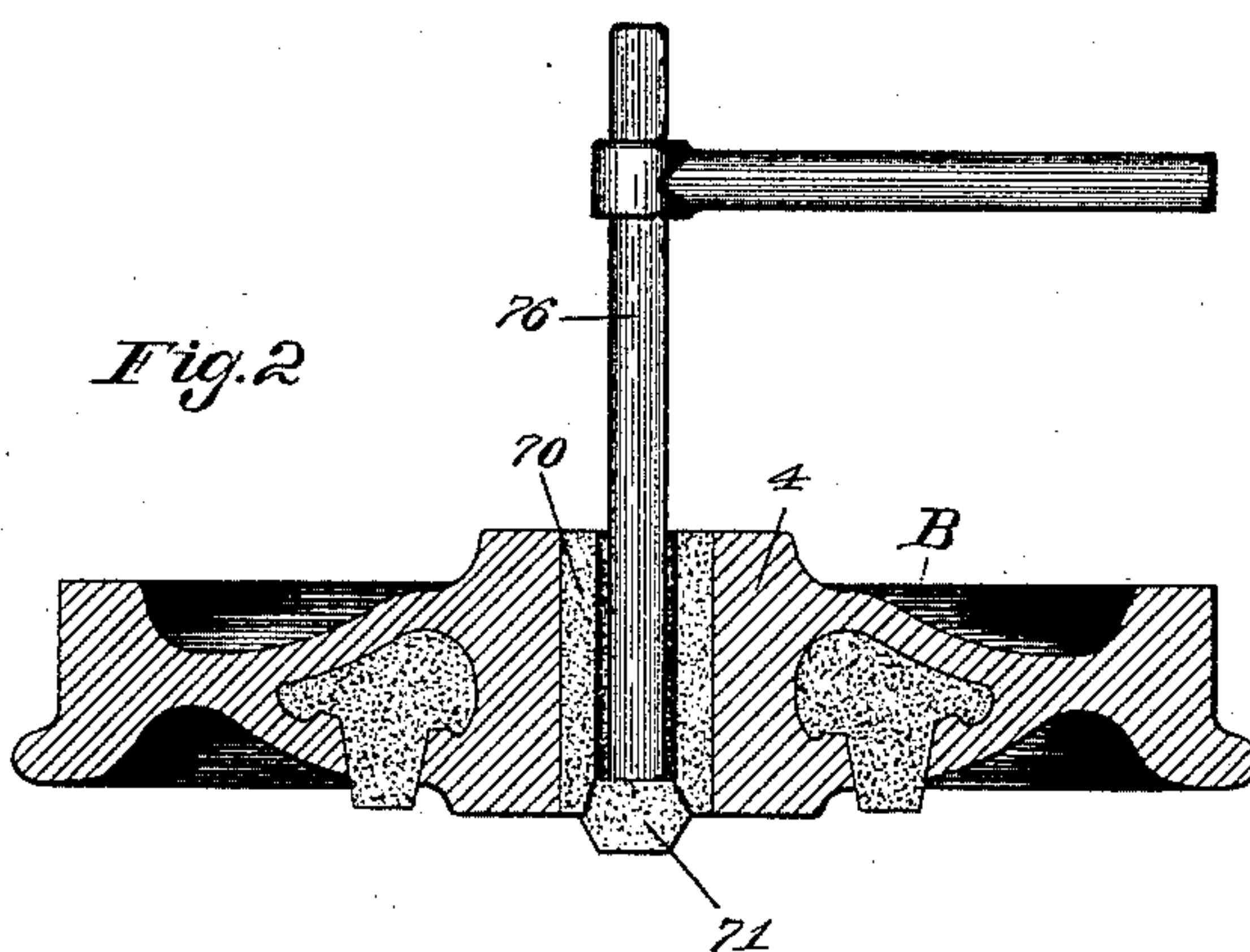


Fig. 4

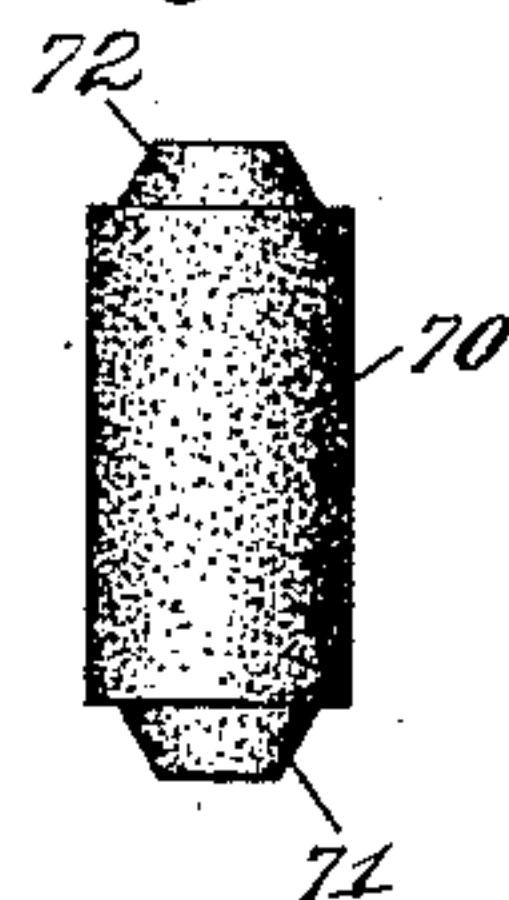


Fig. 3

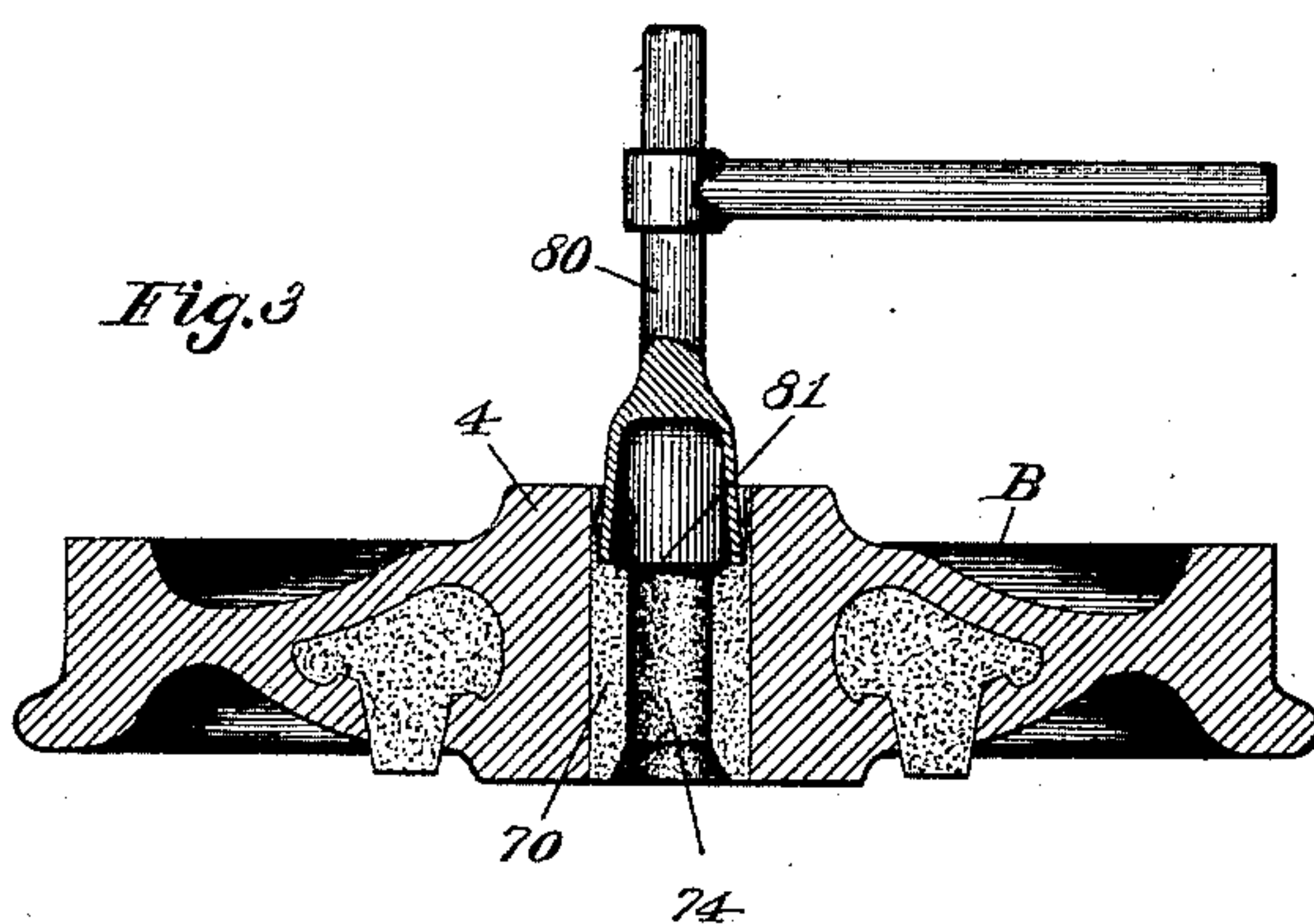
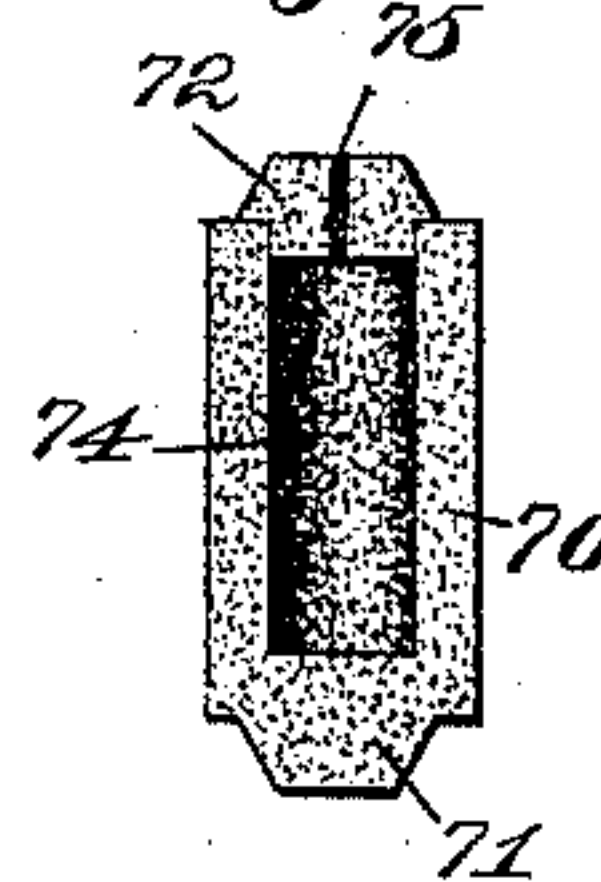


Fig. 5



Witnesses:

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UNITED STATES PATENT OFFICE.

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PROCESS OF CASTING STEEL WHEELS.

SPECIFICATION forming part of Letters Patent No. 461,962, dated October 27, 1891.

Application filed July 14, 1890. Renewed September 26, 1891. Serial No. 406,952. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. RICHARDS, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in the Manufacture of Cored Steel Car-Wheels, of which the following is a specification.

This invention relates to the manufacture by the method of casting of steel car-wheels having central openings, the object being to furnish a method of making an all-steel wheel having such an opening and annealed throughout.

In the drawings accompanying and forming a part of this specification, Figure 1 is a central vertical section of a car-wheel mold having therein a double-plate car-wheel, in the central opening of which there is one of my improved cores. Figs. 2 and 3 are similar sectional views of the car-wheel after its removal from the mold, and illustrate the method of removing the central core. Fig. 4 is a side elevation of the core, ready for use. Fig. 5 is a sectional view of the same, showing the chamber within the core.

The mold shown in Fig. 1 is described and claimed in my application, Serial No. 358,657, filed July 14, 1890, wherein the same is fully described and claimed.

In the manufacture of all-steel car-wheels by the method of casting, the process is first to cast the wheel and afterward anneal the same in suitable furnaces, the wheel being transferred while still red-hot from the mold to the annealing-pits.

For making the central opening in the wheel, the ordinary method is followed of inserting in the mold a core of suitable size and shape, around which the molten metal is poured; but, contrary to ordinary practice, the core for a steel wheel must be made of the most refractory materials, consisting of silica in a coarse form united by a binder. Such cores, however, if made solid, become of great hardness and cannot be safely removed from the hot unsolidified casting. The wheel when it is taken from the mold has already shrunk the greater part of its total shrinkage, therefore by closing onto the central core with an enor-

mous pressure, whereby that core is held in place with such force that it may be driven out in the ordinary way only at the very great risk of damaging the wheel, since this is still very hot and in the interior thereof still in a fluid condition. It is necessary, however, in order to obtain effective annealing of the central part of the wheel to remove the core before the wheel goes to the annealing-pits, and of course this requires the core to be removed while the wheel is still highly heated and sensitive to heavy blows on the core, being a wheel-shaped shell of hot metal filled with fluid metal.

By my improvements a method is furnished whereby to form the central opening by a tubular core adapted to be removed immediately after the wheel is cast without damage thereto. For this purpose I construct the core in the preferred form thereof shown in Figs. 4 and 5 of coarse silica united by a binder and formed with an interior chamber 74, slightly less in length than the length of the outside of the core itself. Said chamber is vented at its upper end for the escape of the expanding gases due to the heating of the core, and at its lower end is closed against the admission of metal by leakage thereunder. On pouring the metal into the mold and on the contraction thereof around the core this core of binded silica yields sufficiently to relieve the strain of the contracting wheel-hub, while furnishing sufficient resistance to support the metal prior to said contraction, but becomes firmly adherent to the inner surface of the steel casting.

On taking the wheel from the mold the workman first knocks off the upper cap 72 by a pointed hammer or instrument for that purpose, and next inserts the punch 76, Fig. 2, whereby the lower end of the core is broken out, thus relieving the tension in the lower part of the core itself. Next, the circular chisel 80, Fig. 3, is placed centrally on the core, and by a series of light blows thereon its edge 81, nearly filling the bore of the wheel, is driven down and cuts the core material from the surface of the wheel-bore, as indicated in said figure. This leaves but a slight covering of silica adhering to the inner

surface of the wheel, not sufficient to materially interfere with the proper annealing of the metal of the hub. The core, being operated upon by an instrument substantially as described, is removed or cut from the surface of the opening by the application of a force longitudinally thereto and simultaneously throughout the periphery of the opening, so that the thin solidified shell or tube of metal then constituting the wall of the central opening is not broken or distorted, although the core be removed, as in practice, before the wheel becomes solidified through the interior of the hub thereof.

In making the core I take a quantity of coarse silica and mix the same with a suitable binder not of great strength, and of this mixture form in suitable core-boxes the hollow cylindrical core. The upper end or cap 72 is formed separately, with the vent or opening 75 therein, and after both parts are properly baked to harden the binder said part 72 is set on the core by the aid of the ordinary core-paste used in this art. This forms the central space or chamber 74 vented at the top and secured against the influx of metal by the integral head 71. The head 71 and the plug or cap 72 are shaped, as a matter of convenience, to form prints for holding the core in place, as will be readily understood from Fig. 1, showing said core set in the mold and within the hub 4 of the wheel B. In the cope 9 there should be formed a vent 76, coinciding with the vent 75 of the core, and in practice this cope-vent should be secured against accidental filling with metal. The print 72, being secured only by the ordinary paste used in core-making, is easily removed, as described, after the wheel is cast.

The importance of securing the inner chamber 74 from influx of metal will be understood when it is remembered that filling said chamber would prevent proper contraction of the walls thereof under the pressure of the contracting wheel-hub, and would also pre-

vent the escape through the vent 75 of the gases within the material of the core itself, for it will be remembered that on the filling of the mold the heat of the molten metal expands the gases then permeating the body of the core, which gases should escape, not through the metal, but through the interior of the core and the vent provided for said interior.

For handling the punches 76 and 80, these are usually provided with suitable handles, as shown in Figs. 2 and 3, respectively, whereby said tools may be handled by one workman, while another drives them through the wheel, using for this latter purpose a light sledge, not heavy enough to injure the wheel-casting by distorting the same.

In practice, after the core 70 is formed, I treat the surface thereof with a core-wash for closing up the porosity of the outer layer of material, with a view to prevent to a considerable degree the outward escape of gases from the body of the core on the heating thereof by the surrounding metal, and thus direct the expanding gases into the chamber 74.

Having thus described my invention, I claim—

The improved method herein described of making annealed center perforated all-steel car-wheels, which consists in casting the wheel around a tubular core, substantially as described, formed of silica united with a binder, and allowing the casting to remain in the mold until solidified on the exterior thereof, removing the wheel and core together from the mold and cutting the core-walls from the heated interior surface of the wheel by force applied simultaneously throughout the periphery of the opening and longitudinally thereof prior to the internal solidification of the casting, and annealing the wheel.

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Witnesses:

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