Aug. 17, 1937. H. WILLSHAW 2,090,278

SAND BLASTING APPARATUS

Filed Feb. 10, 1937 4 Sheets-Sheet 1

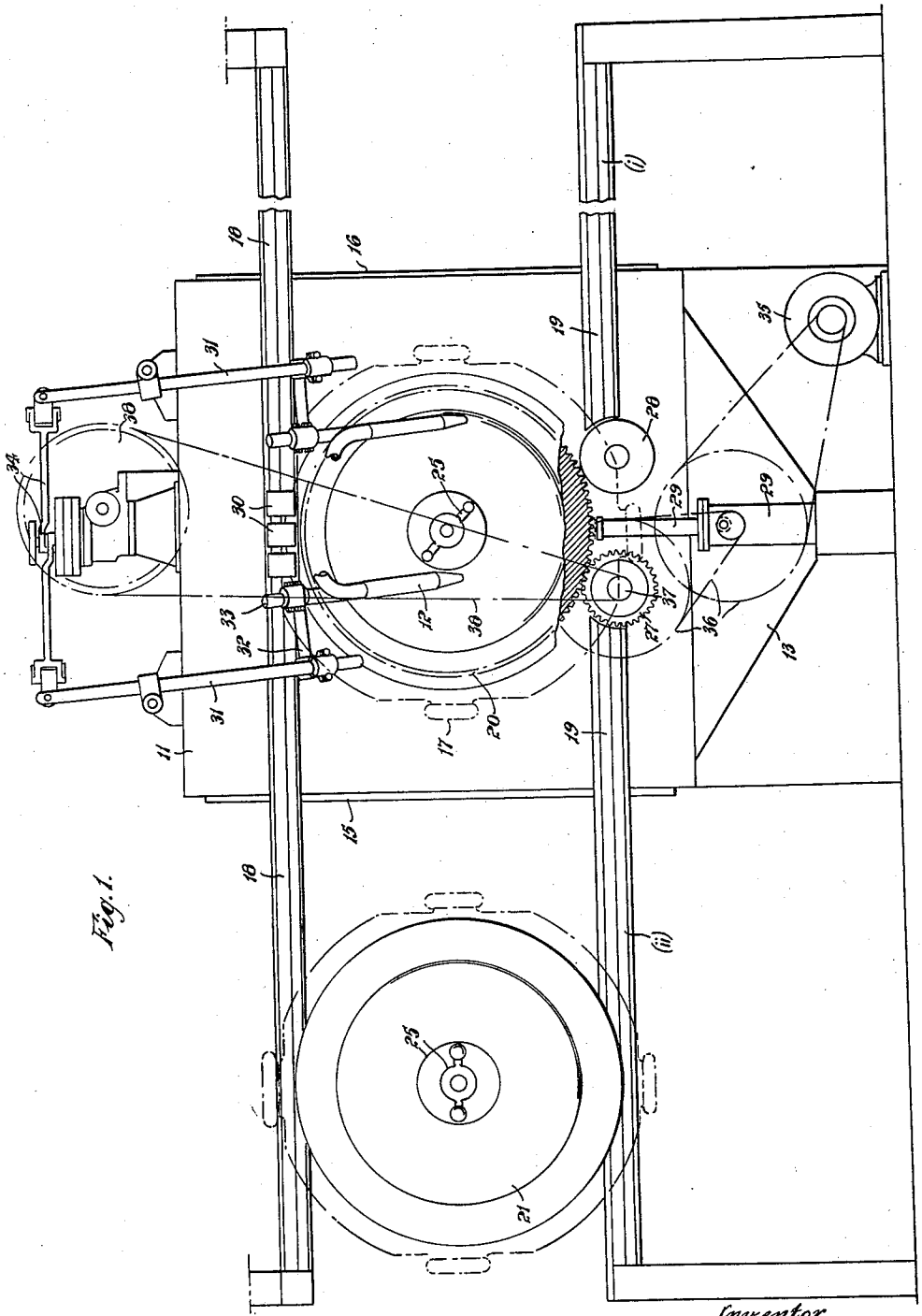


Fig. 1.

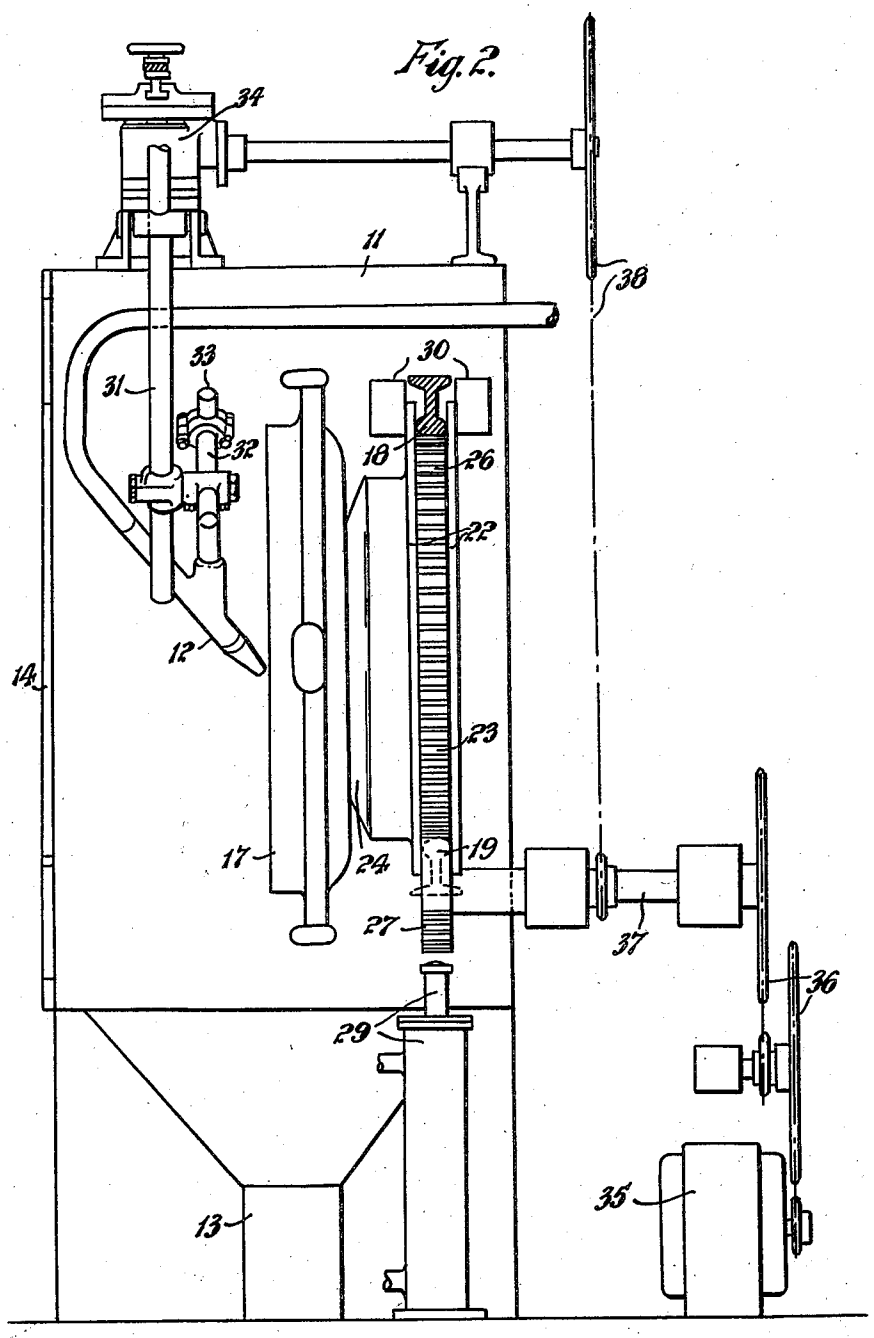
Inventor
Harry Willshaw
by Young & Quigg
his attorneys

Aug. 17, 1937. H. WILLSHAW 2,090,278

SAND BLASTING APPARATUS

Filed Feb. 10, 1937 4 Sheets-Sheet 2

Fig. 2.



Inventor
Harry Willshaw
by Pierce & Rauber
his attorneys

Aug. 17, 1937. H. WILLSHAW 2,090,278

SAND BLASTING APPARATUS

Filed Feb. 10, 1937 4 Sheets-Sheet 3

Fig. 3

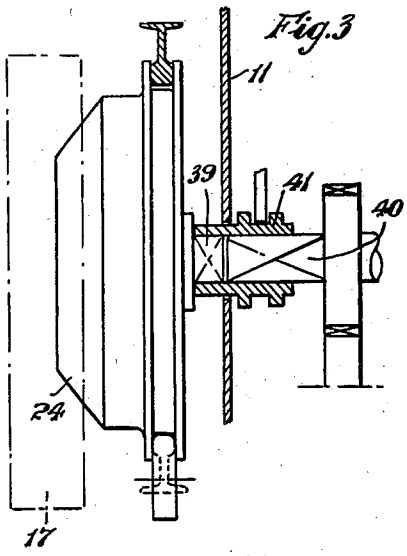


Fig. 4.

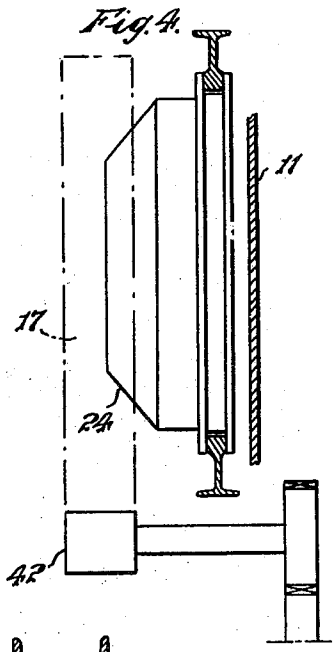


Fig. 5.

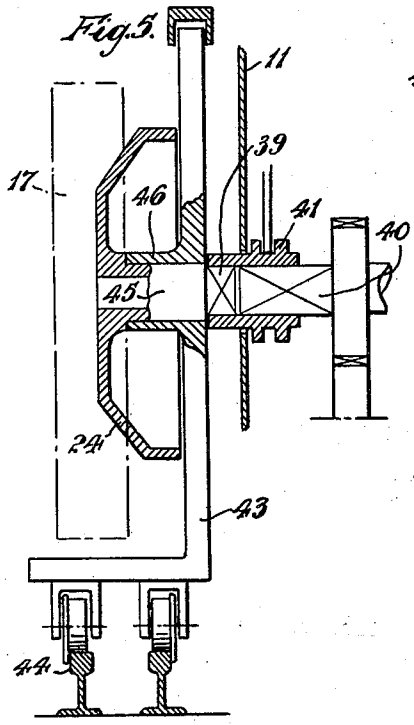
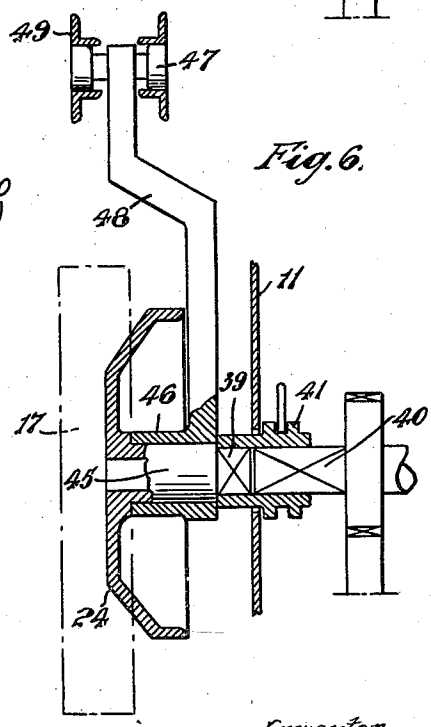


Fig. 6.



Inventor
Harry Willshaw
by Glasina & Rauber
his attorneys

Aug. 17, 1937. H. WILLSHAW 2,090,278

SAND BLASTING APPARATUS

Filed Feb. 10, 1937 4 Sheets-Sheet 4

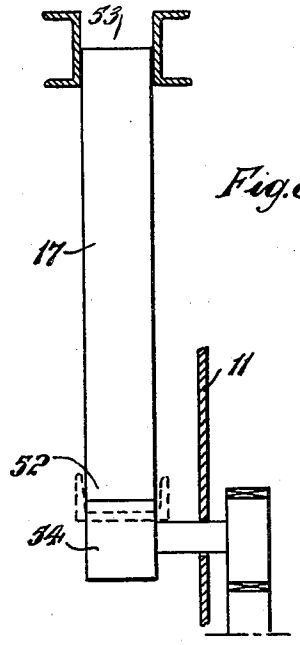
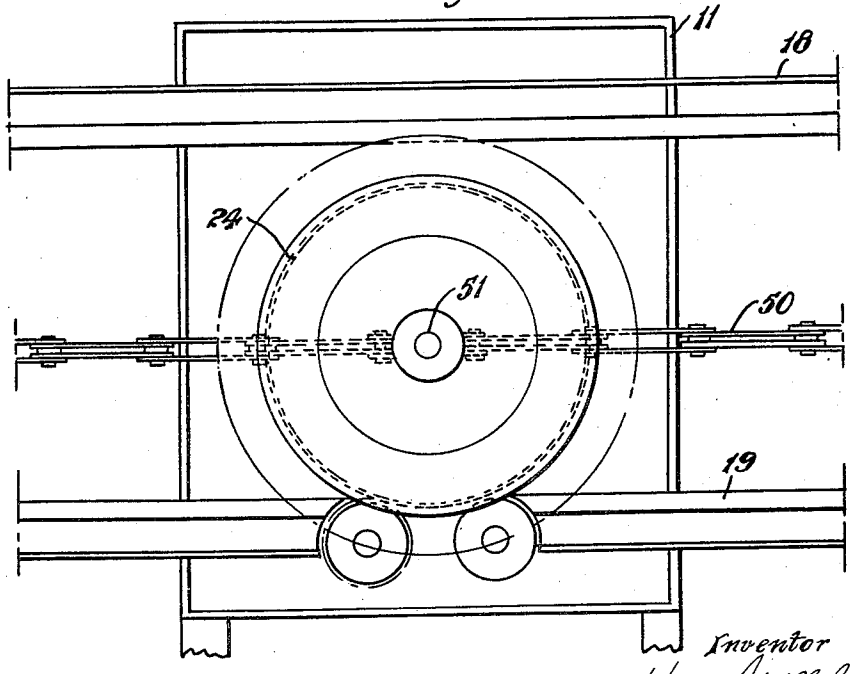


Fig. 8.

Fig. 7.



Inventor
Harry Willshaw
by Kenna & Rauber
his attorneys

Patented Aug. 17, 1937

2,090,278

UNITED STATES PATENT OFFICE

2,090,278

SAND BLASTING APPARATUS

Harry Willshaw, Wylde Green, England, assignor to Dunlop Rubber Company, Limited, London, England, a British company

Application February 10, 1937, Serial No. 125,047
In Great Britain November 27, 1935

6 Claims. (Cl. 51—15)

My invention relates to apparatus for blasting articles, particularly hollow annular articles, such as tire molds with sand or other material.

In sand blasting hollow articles, such as tire molds, the blasting material tends to collect in the contours of the mold, particularly if the latter is disposed horizontally. Consequently, the blast, instead of impinging onto the surface to be blasted may impinge to a large extent upon the sand or other material, which accordingly tends to obstruct and impair the effectiveness of the sandblast.

This tendency is overcome in my present invention, in which the article to be blasted is rotated in such a manner relative to the blasting nozzles, as to cause the sand to fall freely from the surface being blasted and leave the latter freely and unobstructedly exposed to the blast. Preferably, the blasting takes place in a blasting chamber into which the mold or other article to be blasted is conveyed to operative position and then rotated while subjected to the blast.

Any suitable means may be employed for conveying the mold, preferably the mold is rotatably mounted on a carriage, which may be slid or carried or rolled to the blasting position, whereupon it may be rotated as a unit together with the mold, or the mold may be rotated on the carriage by a suitable supporting shaft and clutch arrangement. For example, in a preferred construction, the carriage and mold mounted on it are rolled into the blasting chamber between pairs of guide rails, until it comes to a position on a pair of driving rolls or gears. The rotation of the latter causes the carriage and the mold carried by it to spin with the axis of the mold in approximately the position of the axis of rotation. This rotation brings the material surfaces of the mold above and free of any deposits of sand and in position to receive the unobstructed sand blasts. The driving mechanism may be so arranged either that the carriage automatically comes into engagement with the driving rollers or gears as it reaches operative position, or it may be clutched through a spindle, particularly if it is pushed or conveyed into the chamber by an overhead conveyor or by such mechanism as a pantin roller type of conveyor.

Various features of the invention are illustrated by way of example in the accompanying drawings, in which—

Figs. 1 and 2 are diagrammatic front and end elevations respectively, parts being broken away to show interior constructions, of a preferred form of the invention, a tire mold being shown in full lines in Fig. 2 and indicated in dot and dash lines in Fig. 1, and Figs. 3 to 8 are diagrammatic elevations of various modifications or alternative constructions of the invention, the tire molds or other hollow articles being indicated in dot and dash lines in Figs. 2 to 7 and in full lines in Fig. 8.

Apparatus according to the embodiment of the invention illustrated in Figs. 1 and 2 comprises a blasting chamber 11 containing blasting means preferably comprising a pair of oscillating blast nozzles 12, and a suitable take-away 13 for the used blasting material.

The front and the two ends of this chamber are provided with doors—a vertically sliding door 14 at the front for inspection purposes and hinged doors 15 and 16 at the ends to permit ingress and egress of the molds 17.

Passing through said doors 15 and 16 into and out of the chamber are two rails 18 and 19, one above the other, on which the carriage aforesaid is adapted to run, said carriage, 20, being disposed vertically between said rails and rotating on a horizontal axis as it rolls therealong.

It is convenient to use two carriages so that when the one 20 is in use in the chamber another 21 is available for loading.

In its preferred form the carriage is of annular construction and comprises (*a*) a part having guiding coaction with said rails, (*b*) a part having rolling coaction therewith, (*c*) a part which provides anchorage for the mold, and (*d*) a part having driving coaction with driving means inside the chamber.

As shown in Figures 1 and 2, part (*a*) comprises a pair of annular flanges 22 which embrace the sides of the rails, part (*b*) comprises a cylindrical structure 23 which rolls on the lower rail, while part (*c*) comprises a central structure 24, made conical to seat a range of different size molds, upon which the mold is anchored by a clamp plate and central screw 25: and part (*d*) is provided by part (*b*) having gear teeth 26.

Said teeth actually roll on the surface of the lower rail during the transportation phases of the operation and are complementary to teeth on a driven gear wheel 27 disposed in the blasting chamber for the purpose of rotating the carriage 20, spaced laterally from this gear wheel is a further wheel 28 which acts as a bearing wheel for the carriage during the driving phase of the operation.

As shown in Fig. 1 these wheels 27 and 28

break into the lower rail 19 which is thus in two parts (*i*) and (*ii*) extending to and from said wheels, so that when the carriage is rolled along said rails its teeth 26 will automatically register with the gear 27 when they roll over and into alignment therewith.

Means are preferably provided to lift the carriage out of engagement with the wheels 27 and 28 when blasting is over, so as to ease the difficulty of getting said carriage loaded with the heavy mold, onto the take-away rail. These means may comprise mechanical power magnifying means, such as systems of levers, or as shown in Figs. 1 and 2, may comprise a fluid-pressure operated plunger 29 adapted to contact a part of the mold or carriage to effect said lifting, thereby to make said carriage free to be rolled onto the rail along which it is transported out of the chamber.

The preferred manner of operating this particular embodiment of my invention is as follows:—

Assume that a given tire mold is being treated, one carriage, 20, being engaged in operating in the chamber, and assume that another carriage, 21, is empty on the left-hand rail outside the chamber as shown in Fig. 1.

While the treatment of the one mold proceeds, another mold is brought, by overhead hoist or other means, to the empty carriage 21, is placed thereon, and is fastened thereto by the clamp plate and attaching means such as a bayonet type joint or central screw 25. When the mold being treated is finished, the end doors are opened, the piston 29 is operated to lift said mold off the wheels 27 and 28, and the carriage is then rolled onto the right-hand rail (*i*) and therealong out of the chamber.

The support 21 carrying the other mold to be cleaned is then rolled along the left-hand rail (*ii*) into the chamber, the gear teeth 26 rolling into driving engagement with the gear wheel 27, and into supporting coaction with the bearing wheel 28.

The end doors are then shut and blasting is carried out. The treated mold is then removed from its support leaving the same empty for the above sequence to be repeated as desired, next time from right to left, then from left to right, and so on.

It should be understood that I do not confine myself to the above embodiment of my invention, the following alternatives, modifications or additions being given by way of example.

Additional mold-guiding, aligning or supporting means may be provided particularly inside the chamber, said means comprising for example rollers 30 against which the mold or the carriage may bear during rotation.

The invention is of course preferably used in association with the usual adjuncts common to sandblast plant such for example as oscillating blasting nozzles and means for reclaiming the blasting material through filters or the like.

Means may be provided to adjust the nozzles so that they play on the mold in the most efficient manner, both as to angle, alignment, speed and/or path of oscillation.

As shown in Figs. 1 and 2 each nozzle mechanism conveniently comprises three bars 31, 32 and 33. In use bars 32 and 33 are fixed on bar 31 which oscillates, to traverse the nozzle to and fro across the mold, by means of the crank mechanism 34. For adjustment purposes, by manipulating the bars 32 and 33 in relation to each other and the bar 31, various positions of the nozzle can be readily arrived at.

The preferred form of drive as shown comprises a motor 35 which drives via chain gearing 36 a shaft 37 which drives the gear 27 directly and the crank mechanism 34 via further chain gearing 38.

Instead of rotating the mold as illustrated I may use a suitable clutch arrangement comprising, as shown for example in Fig. 3, a part 39 fixed to the carriage, and a driven part 40, adapted to be operatively coupled together by a sliding part 41.

This coupling may be either a positive drive or a friction or other suitable drive, as for example suitably disposed cones or the like; in the circumstances however positive gearing is preferred.

Instead of the carriage itself engaging driving means, said carriage may be provided primarily for transporting the mold into and out of the chamber and supporting it therein, drive being actually applied to the mold itself rather than to the carriage, as shown for example at 42 in Fig. 4, this being applicable in instances where there is a periphery of the mold which is sufficiently truly circular.

Instead of complete rotation we may use rotational oscillation for the mold.

As to the means for transporting the mold into and out of the chamber, it should be understood that this does not necessarily comprise rails as described, for example said transporting means may be some other form of conveyor, as for example of the pantin roller type along which the mold would be slid.

Or, as shown for example in Fig. 5, the mold may be carried upon a wheeled truck 43 adapted to run on rails or a suitable guideway 44, said mold for example being carried upon a spindle 45 associated with a clutch similar to that shown in Fig. 3, in this instance the part 39 being fixed to the spindle 45.

As shown in Fig. 5, said spindle rotates in a bearing 46 in said wheeled truck; alternatively such a spindle may be carried by some other form of transporting means, for example, roller chain means 47, as shown in Fig. 6.

In this alternative, the bearing 46, in which rotates the spindle 45 carrying the mold 17, is carried by a sling 48 pendant from the chain 47, the latter being supported in runners 49; the clutch mechanism may be the same as before.

The mold may be moved into and out of blasting position by any suitable means, as for example by simple hand manipulation—rails where used may be inclined or tiltable—or I may provide suitable haulage or mechanical transporting or assisting gear comprising, for example, a lever or the like to magnify the hand effort of rolling.

Alternatively, as shown in Fig. 7 in application to the arrangement according to Figs. 1 and 2, I may use a chain 50 preferably power driven and adapted to progress the molds along the rails 18 and 19, said chain as shown coacting with a bearing 51 at the centre of the cone 24 to allow the carriage to rotate.

A chain, such as this, may be the sole or main conveying or transporting means, the rails, for example, merely taking the weight.

And finally it should be understood that I do not necessarily use a separate carriage as aforesaid. For example, the mold itself or a part thereon may coact with suitable transportation means, which take said mold into and out of

the chamber, and with suitable driving means, which rotate said mold inside said chamber.

For example, as shown in Fig. 8, I may roll the mold itself along channels **52**, **53** and rotate it by driving means **54** inside the chamber.

Having now particularly described my invention, I claim—

1. Means for blasting hollow annular articles with sand or the like which comprises a blasting chamber, a blasting nozzle in said chamber, upper and lower guiding and supporting rails leading toward said nozzles in said chamber, a carriage having means to hold an article to be blasted with its axis horizontal and approximating the axis of said carriage, said carriage having a circular part to roll on and be guided by said rails moving toward said nozzles and means near said nozzles to support and rotate said carriage about its horizontal axis.

2. Apparatus for blasting hollow annular articles such as tire molds with sand or the like which comprises a blasting nozzle, a runway, a carriage rolling on and guided in said runway to a position near said nozzle, rotating driving and supporting wheels to support said carriage for rotation in front of said nozzles and means for lifting said carriage from said supporting wheels back to said runway.

3. Apparatus for blasting hollow annular articles such as tire molds with sand or the like which comprises a blasting nozzle, conveying means comprising a carriage on which said article is mounted, guide rails supporting said carriage and on which said carriage rolls to and from a blasting position relative to said nozzle and a pair of wheels for supporting and rotating said carriage on an axis approximating the axis of said hollow article when in blasting position relative to said nozzle.

4. Apparatus for blasting hollow annular articles such as tire molds with sand or the like which comprises a blasting nozzle, conveying means for conveying articles to be blasted to and from a stationary blasting position relative to said nozzle and comprising a carriage movable to and from blasting position, a spindle on said carriage to support the article to be blasted and means to rotate said spindle while in fixed stationary blasting position relative to said nozzle.

5. Apparatus for blasting hollow annular articles such as tire molds with sand or the like which comprises a blasting nozzle, means for conveying a carriage to blasting position relative to said nozzle and to rotate it with its interior in blasting position relative to said nozzle, said means comprising a carriage having external gear teeth, rails to guide and support said carriage to and from its position of rotation and a spur gear to engage the teeth of said carriage to drive the latter when in blasting position.

6. Apparatus for blasting hollow annular articles such as tire molds with sand or the like which comprises a blasting nozzle, means for rotating said article on its horizontal axis with its interior in operative relation to said nozzle, a runway, a carriage for said article rolling on and guided in said runway to a blasting position and rotating driving and supporting wheels to rotate said carriage in blasting position.

HARRY WILLSHAW.