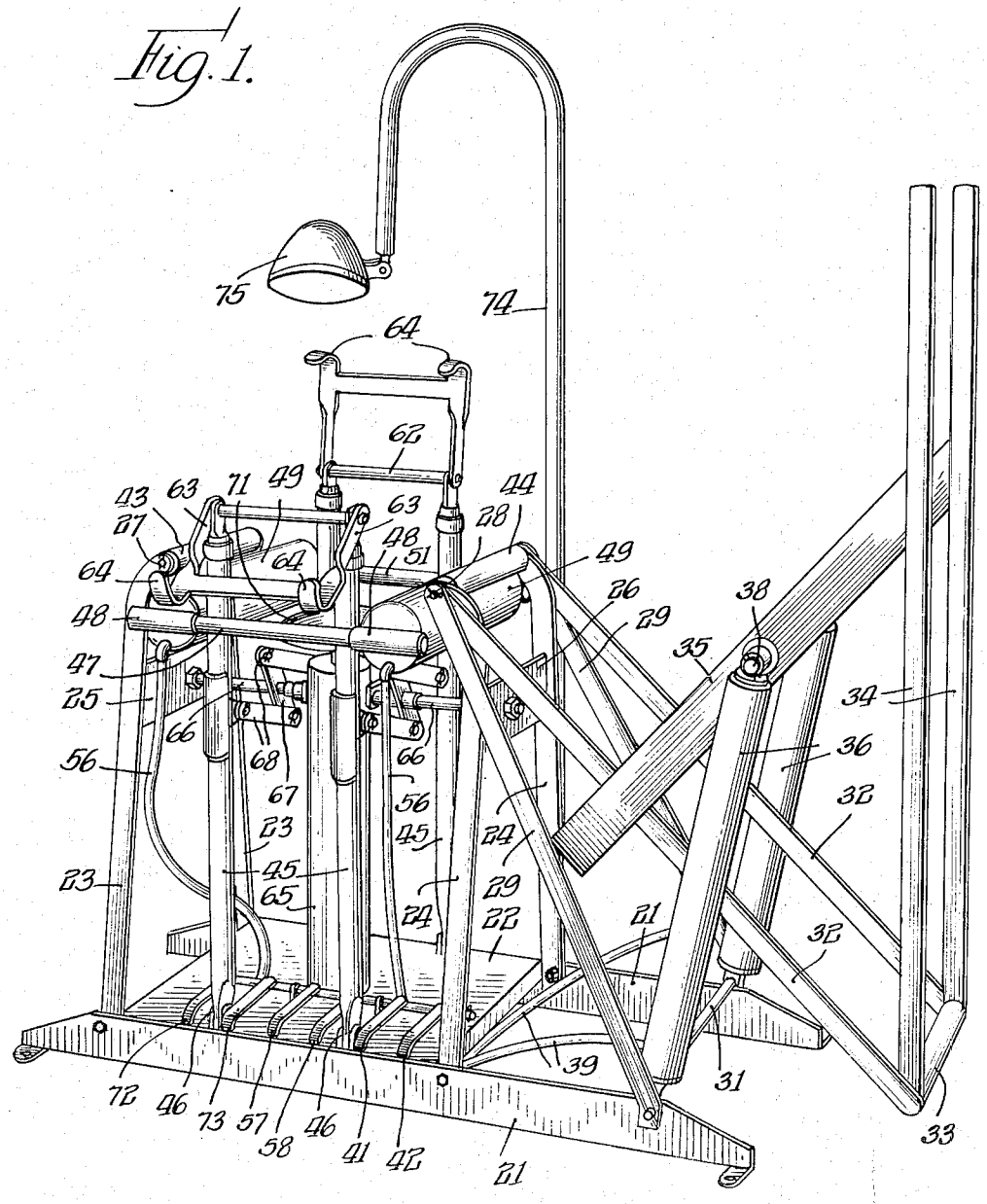
May 8, 1945. R. G. STOEHR 2,375,595

TIRE-CASING SPREADING AND INSPECTING MACHINE

Filed July 21, 1944 5 Sheets-Sheet 1

Fig. 1.



INVENTOR.
Rolla G. Stoehr
BY: Walter M. Fuller
Atty.

May 8, 1945. R. G. STOEHR 2,375,595

TIRE-CASING SPREADING AND INSPECTING MACHINE

Filed July 21, 1944 5 Sheets-Sheet 2

Fig. 2.

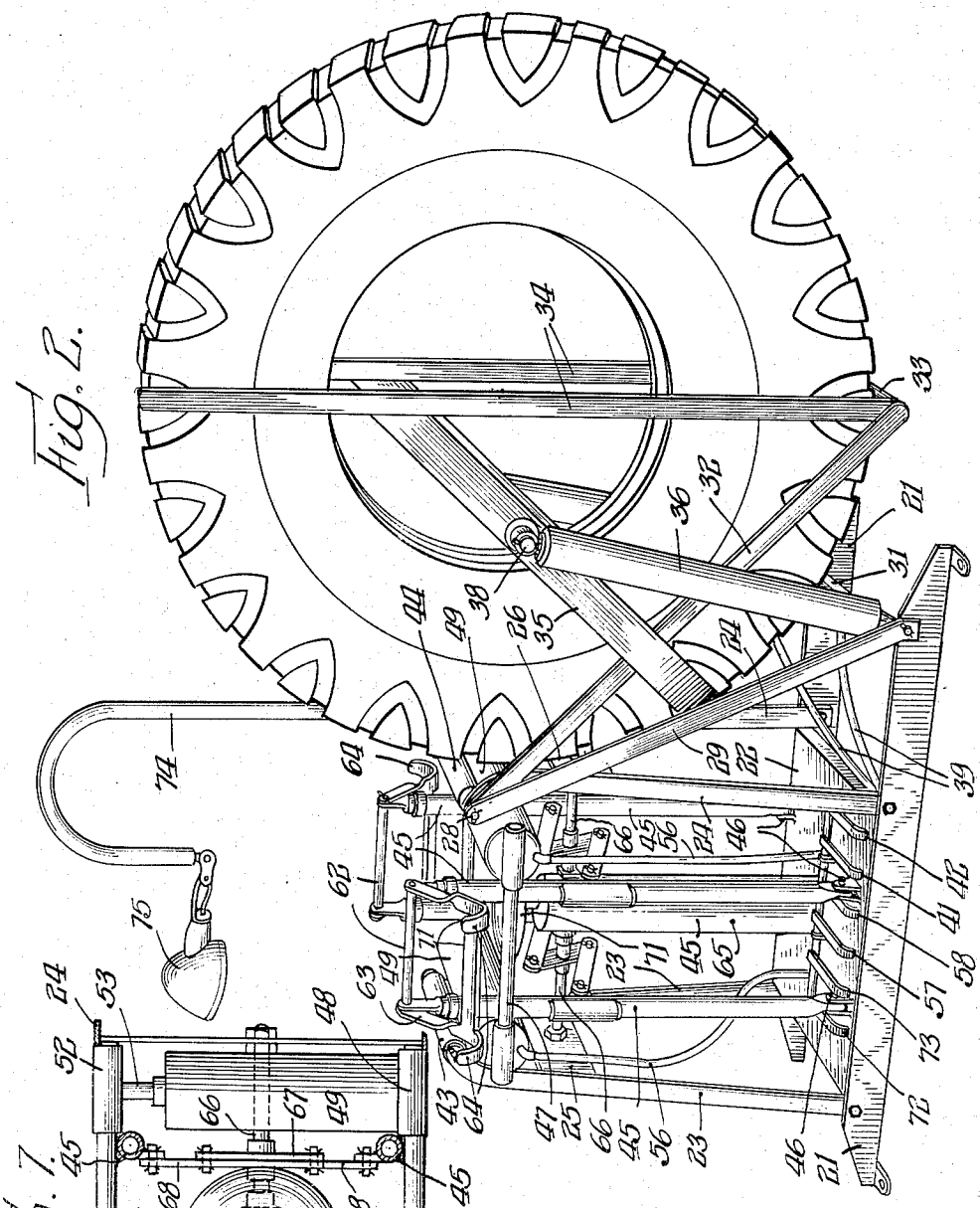
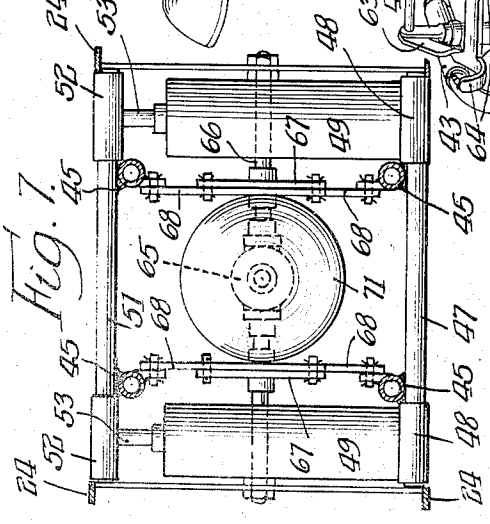


Fig. 1.



INVENTOR.
Rolla G. Stoehr
BY: Walter M. Fuller
atty.

May 8, 1945. R. G. STOEHR 2,375,595

TIRE-CASING SPREADING AND INSPECTING MACHINE

Filed July 21, 1944 5 Sheets-Sheet 3

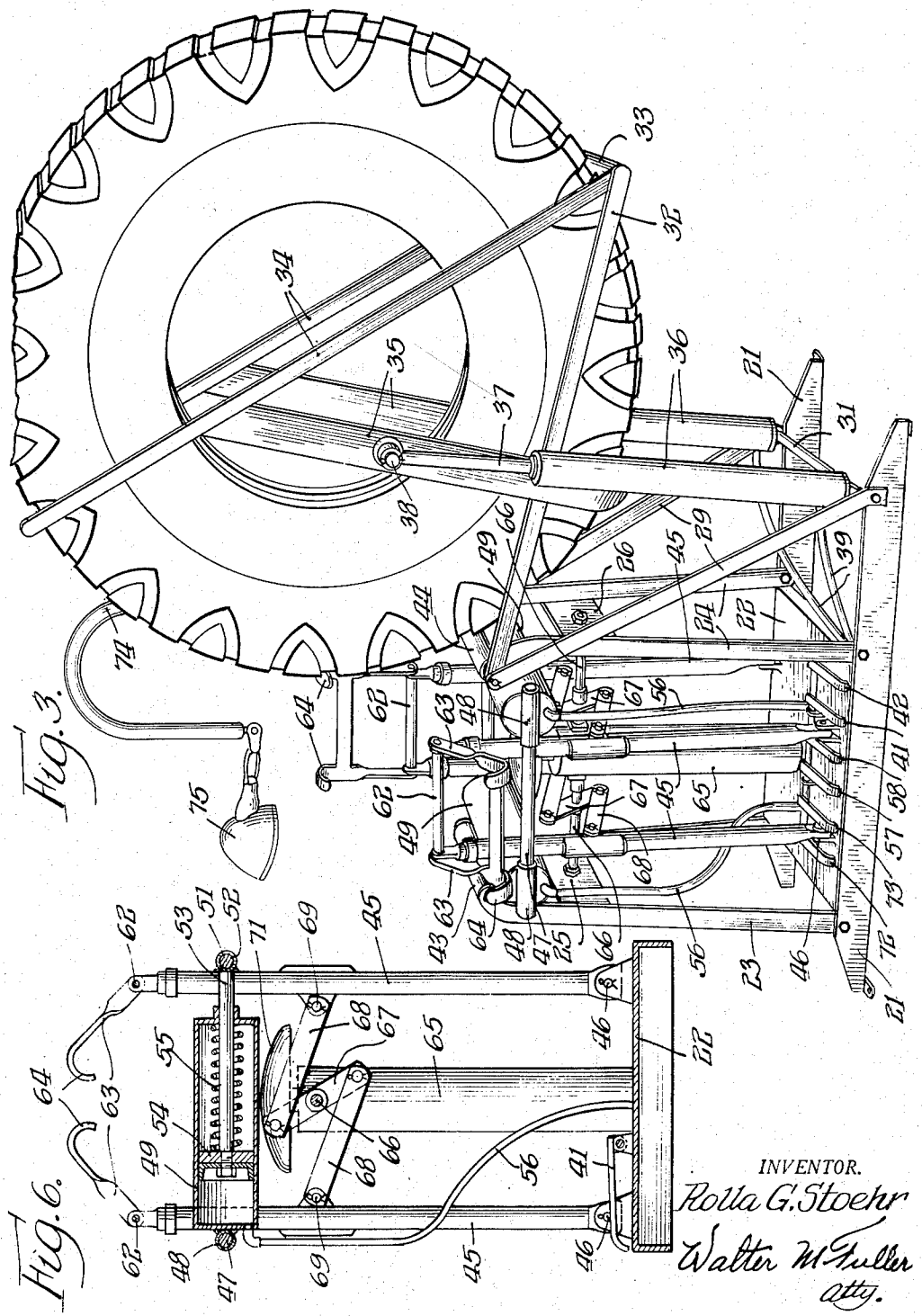


Fig. 3.

Fig. 6.

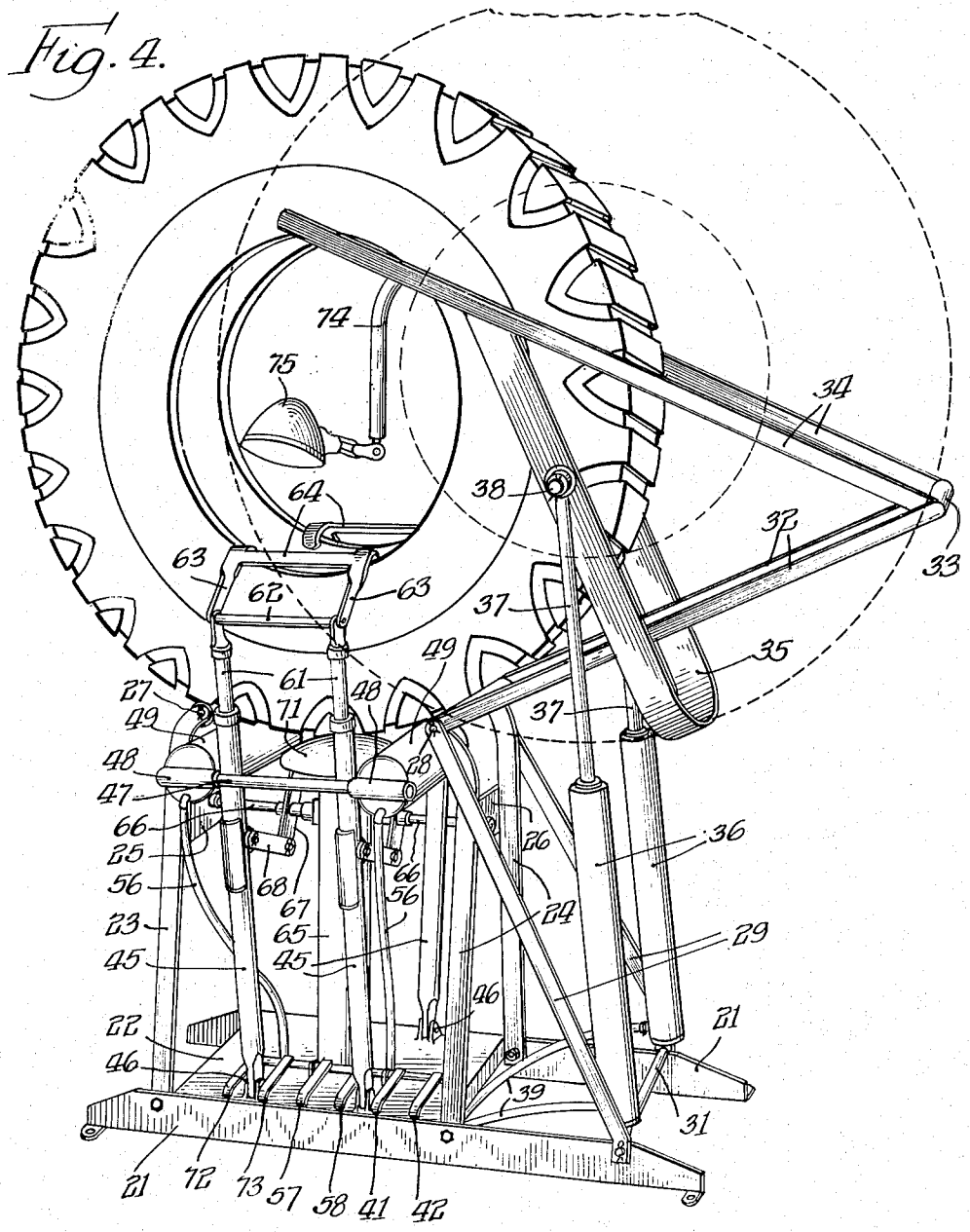
INVENTOR.
Rolla G. Stoehr
Walter M. Fuller
atty.

May 8, 1945. R. G. STOEHR 2,375,595

TIRE-CASING SPREADING AND INSPECTING MACHINE

Filed July 21, 1944 5 Sheets-Sheet 4

Fig. 4.



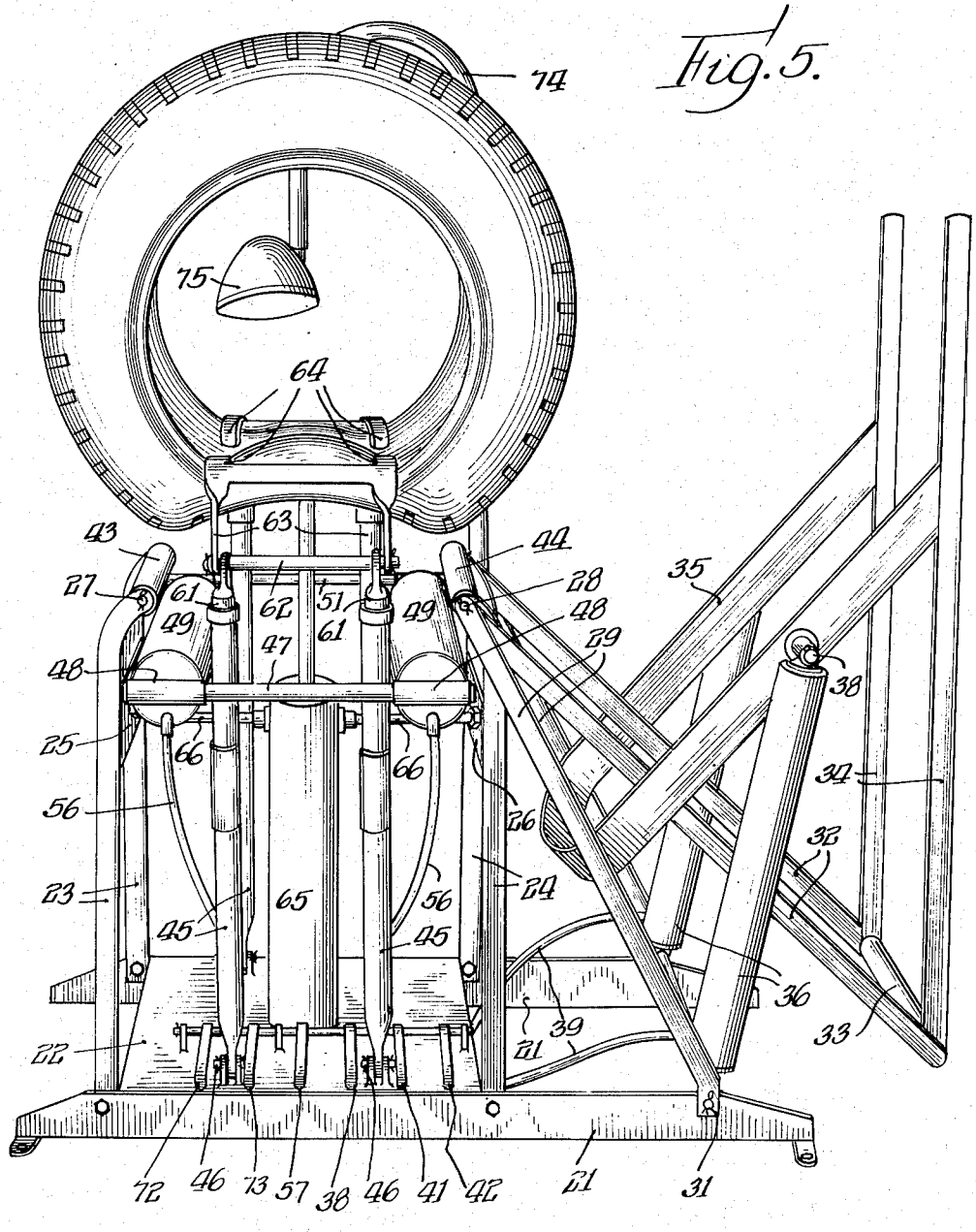
INVENTOR.
Rolla G. Stoehr
BY Walter M. Fuller
Atty.

May 8, 1945. R. G. STOEHR 2,375,595

TIRE-CASING SPREADING AND INSPECTING MACHINE

Filed July 21, 1944 5 Sheets-Sheet 5

Fig. 5.



INVENTOR.
Rolla G. Stoehr
BY Walter M. Fuller
atty.

Patented May 8, 1945 2,375,595

UNITED STATES PATENT OFFICE

2,375,595

TIRE-CASING SPREADING AND INSPECTING MACHINE

Rolla G. Stoehr, Chatham, Ontario, Canada, assignor to Weaver Manufacturing Company, Springfield, Ill., a corporation of Illinois

Application July 21, 1944, Serial No. 546,040

3 Claims. (Cl. 154—9)

The current invention concerns certain novel and beneficial changes and modifications in tire-casing spreaders, whereby to obtain heretofore unavailable substantial structural and functional advantages.

One object of the invention is to provide satisfactory and efficient means for lifting or elevating the tire-casing up to the spreading portion of the mechanism with practically no expenditure of material manual effort and to be able also to lower the examined tire-casing again to the floor or ground with ease and facility.

A further aim of the invention is to hold the tire-casing from tipping over sidewise, when supported on the rollers of the spreader part of the machine, by a portion of such casing-elevating mechanism.

An added purpose of the invention is to supply a machine of the specified character which will function efficiently with all ordinary sizes of tire-casings without substantial adjustment of any part, such tire inch sizes ranging from 4½ x 21 to 14 x 24 x 16 ply, the spreading being as much as 15 inches, the machine being also capable of properly handling tractor tire-casings of any size up to 14 inches in cross-section, although it is to be understood that the machine could be made of larger size for satisfactory operation on casings of still greater dimensions.

As to the casing expanding or dilating part of the machine, one novel feature therein resides in the fact that the means for actuating the tire-casing spreader-hooks and the means for operating a casing-tread inverter or deformer are independently operable.

Another innovatory feature of the structure incorporating the present invention is the reality that, when the tire-casing is being distended by the expanding hooks engaging its beads, the latter gradually lower, but the travel of the hooks is parallel to the action of the operating compressed-air cylinder and piston, or ram means, whereby the power consumed is maintained as low as the amount of work performed will permit.

The use of dual compressed-air cylinders-and-pistons to actuate such spreader-hooks is also of distinct advantage in that they may be positioned to better practicality than where a single cylinder and its piston are employed for performing the same function.

A supplemental advantage in the new structure is that the opposed tire-casing spreader-arms are controlled by equalizing-means causing them at all times to operate at equal distances from the center of the tire-casing tread inverting or deforming ram.

Also due to the fact that the machine is engineered to operate at maximum efficiency, the amount of compressed-air used for its operation is economical and the pressure required is readily available.

The manner in which the foregoing and other distinct benefits and advantages are attained will be understood from the following description taken in connection with the accompanying drawings illustrating a present, preferred embodiment of the invention and in the several views of which the same mechanical parts have been designated by like reference characters.

In these drawings:

Figure 1 is a perspective view of the machine;

Figure 2 is a similar view after the elevating cradle of the appliance has received a tire-casing at substantially floor level;

Figure 3 is an analogous showing of the mechanism with the lifting-cradle and its contained tire-casing in partly elevated position;

Figure 4 is a corresponding presentation of the appliance but with the cradle in its uppermost position and with the tire-casing supported on the rollers of the spreading part of the machine;

Figure 5 illustrates the apparatus and a smaller size tire-casing spread thereby and without the use of the lifting-cradle;

Figure 6 is a vertical cross-section through the appliance, depicting the spreader-hooks and their operating and equalizing means; and

Figure 7 is a fragmentary horizontal section through the machine.

Referring to these drawings, it will be noted that the compound and cooperative tire-casing lifting and spreading appliance includes a frame having a base with a pair of parallel, horizontal, side floor-bars 21, 21 and an intervening, flat platform 22, such base rigidly supporting four, upstanding columns or bars 23, 23, and 24, 24 curved at their upper ends, the one pair 23, 23 being fixedly joined together by a plate 25, and the other pair 24, 24 being in like manner connected together by a comparable plate 26, these two plates being fastened or bolted together in a manner set forth hereinafter, whereby the frame, as a whole, possesses adequate rigidity and strength to withstand all strains to which it may be subjected in service.

A cross rod or shaft 27 occupies aligned holes in the top ends of the companion posts 23, 23 and by means of cotter-pins ties such ends together, and, in similar manner, a spindle or arbor

28 is mounted in the upper ends of posts 24, 24 and performs a comparable function, the opposite protruding ends of part 28 having mounted thereon the upper terminal portions of a pair of inclined brace-bars 29, 29, the lower ends of which are in kindred manner connected to the ends of a cross shaft or rod 31 mounted laterally in approved manner on the base-bars 21, 21.

Rockingly supported or hinged on the opposite ends of the transverse, horizontal shaft or rod 28 at their upper ends are two, parallel, spaced-apart bars 32, 32 fixedly joined together at their lower ends by a tube 33 welded at its ends thereto, and also welded to such parts 32, 32 and 33 are a pair of normally-upright bars or arms 34, 34 equidistant throughout, a U-shape yoke or saddle 35 having its sides welded to the two pairs of bars 32, 32 and 34, 34 as shown at points intermediate their length, these various united elements constituting a hinged cradle or carrier into which the tire-casing to be tested may be easily rolled by hand over the tube 33 into engagement with the confining and supporting yoke or saddle 35, all as is clearly illustrated, to be supported by the members 33 and 35 and maintained in upright position by the parts 32, 32, 35 and 34, 34.

In order to rock or swing this cradle and its contained tire-casing upwardly around the axis of the shaft or rod 28 to the supporting rollers of the testing and inspecting part of the mechanism and to lower the tire-casing to the ground or floor again, a pair of parallel, combined, compressed-air cylinders 36, 36, their contained pistons or plungers (not shown) and their piston-rods 37 are arranged for operative movement by being rockingly mounted at the lower ends of the two cylinders 36, 36 on rod or shaft 31, the two piston-rods 37, 37 being hinged at intermediate points 38 on the sides of the yoke 35 (Figure 4).

The compressed-air simultaneously enters the lower portions of such cylinders 36, 36 below their pistons through flexible conduits 39, 39 by foot-depression of pedal 41 and such air is allowed to exhaust or escape from the cylinders by actuation of pedal 42 to permit descent of the elevated cradle and its contained tire-casing, all as will be readily understood by those skilled in the art, whereupon the inspected casing can be readily rolled out of the cradle on to the floor or ground.

The spreader and inspection or examination portion of the appliance includes two, horizontal, spaced-apart, parallel, revoluble, tire-casing supporting-rollers 43 and 44, the former on shaft or rod 27 and the latter on shaft or spindle 28, on to which the tire-casing in the elevated or lifted cradle may be manually rolled and maintained in vertical relation by the side-members of the cradle between which the tire-casing remains as illustrated in Figure 4.

At each of the opposite sides of the machine (Figures 1 and 6) is a pair of upright, parallel tubes 45, 45 hinged on the base at 46, 46, permitting them to swing or rock toward and from the plane of the supported tire-casing, such tubes at the two sides being in register crosswise the machine, one pair of such tubes 45, 45 having a horizontal cross rod or shaft 47 welded to the outer-faces of the tubes, this element 47 having rockingly mounted thereon, outwardly beyond the hinged tubes 45, 45, a pair of bearings 48, 48 welded to the ends of twin, horizontal, parallel, separated compressed-air cylinders 49, 49, the companion pair of hinged tubes 45, 45 at the other side of the machine having welded thereto a cross-rod 51 at the same height as the corresponding member 47, and similarly rockingly connected at 52, 52 to the protruding ends of the piston-rods 53, 53 of the pistons 54, 54 in the cylinders 49, 49, the latter accommodating coiled springs 55, 55 between the pistons and one end-wall of the cylinders to restore the pistons automatically to their inoperative positions near the other end-wall of the cylinders when permitted to do so.

The compressed-air for actuating this portion of the apparatus enters the ends of the two cylinders 49, 49 through flexible-tubes 56, 56 under the control of the foot-operated pedal 57, the discharge of the compressed-air from the cylinders being governed by pedal 58, all as will be readily understood.

The open top ends of each pair of hinged tubes 45, 45 slidingly accommodate two plungers or rods 61, 61 (Figure 4) carrying in registered apertures in their flattened tops a rod 62 on the extended ends of which are hinged the spaced arms 63, 63 of a double hook-member, characterized as a whole 64, adapted to engage rockingly over the opposite beads or edges of the tire-casing to be subjected to its inspection.

In order that these two, oppositely disposed, spreader, bead-engaging hooks 64, 64 may always travel equal distances in opposite directions from the middle plane of the machine and the tire-casing thereon, the following equalizers are employed:—

Mounted vertically on the base of the machine, centrally with relation to the tire-casing supporting-rollers 43, 44 and directly below the center of the tire-casing supported thereon, is a fifth upright compressed-air cylinder 65, and fixed to the opposite sides of such cylinder in the plane of its axis and secured to the plates 25 and 26 and in register or alignment with one another are a pair of stationary level rods or shafts 66, 66, each of which has rockingly mounted thereon the center of an oscillatory arm 67 (Figure 6) whose opposite ends are connected by a pair of equal-length links 68, 68 to corresponding points 69, 69 on the hinged tubes 45, 45 of the same transverse pair.

Cylinder 65 houses a piston or plunger and its spring, neither of which is shown, since they are similar to the illustration of Figure 6, the top end of the piston-rod carrying centrally beneath the bottom of the tire-casing a suitably-formed or curved presser, reverser, inverter, or ram-head 71 to press or force upwardly and invert the lower spread portion of the tire-casing as is well understood in the art, the elevation of such presser being controlled by the admission of compressed-air into cylinder 65 beneath its plunger by pedal 72 and the descent of the plunger or presser being governed by the discharge of the air by the use of pedal 73, all as will be readily comprehended.

In addition, the appliance is equipped with an upstanding, curved rod 74 against which a small-size tire-casing may rest sidewise while being spread or opened up when the lifting cradle is not employed, such rod carrying an adjustable electric-lamp 75 to assist in the tire examination.

For a heavy or large size tire-casing, the appliance is used as follows assuming that the lifting cradle is in its lowermost position:

The casing is rolled by hand over tube 33 into the cradle as indicated in Figure 2 and is sup-

ported therein by elements 33 and 35 being precluded from falling over laterally or sidewise by the sustaining members 32, 35 and 34.

Upon depression of pedal 41 by the operator, air under suitable pressure is admitted into both cylinders 36, 36 in equal amounts, their pistons or plungers ascend rocking the cradle and its casing upwardly around the axis of the stationary rod or shaft 28 until the tire contacts roller 44, or is partially rolled over such roller, but not enough to allow it to continue travel forwardly by itself over and beyond the roller, as shown by the dotted circle in Figure 4, Figure 3 portraying the cradle and casing during such upward travel and Figure 4 depicting the final limit of travel of the cradle.

Then the tire is manually rolled over supporting roller 44 until it is entirely sustained on the two rollers 43 and 44, as illustrated in full lines in Figure 4, in which position it is nevertheless precluded from falling over sidewise by the cradle.

Thereupon the two, opposed double-hooks 64, 64 are lifted sufficiently to allow them to be applied over the opposite beads of the tire-casing which is done.

Now the operator, by depressing pedal 57, admits compressed-air into the two horizontal cylinders 49, 49 resulting in the spreading apart or separation of the two hooks in equal degree outwardly and in the corresponding opening of the tire-casing at that location for inspection.

If, upon examination, it is found that this is not the damaged area of the casing, the air is released from the cylinder by downward rocking of pedal 58 causing the hooks to cease their casing opening function, whereupon the casing is turned by hand on its axis on its supporting rollers 43, 44 to bring a new zone of the interior thereof into place for inspection, upon the completion of which the hooks are caused to enlarge that part of the tire-casing for observation, and so on until the injured part of the tire-casing is discovered.

This having been accomplished, and such section maintained opened up by the hooks, and then depending upon the size of the casing and its number of fabric-plies, the presser or inverter 71 may or may not be availed of, and if employed, the workman actuates foot-lever 72 to introduce air under pressure into cylinder 65 which action causes its piston and piston-rod to elevate the fashioned block or inverter 71 to deform or reverse upwardly that portion of the tire-casing spread open by the hooks to facilitate more minute observation of the injury and to permit its efficient remedy.

When the tire-casing is large in size and of many plies in thickness, such as those used on trucks, the tire-manufacturers recommend that the casing be not inverted or bulged upwardly for servicing because of possible damage to the heavy tread, and in those instances the inverter and its ram-operating means would not be employed.

For that and another valid reason, the casing-spreading means and the inverter, reverser or deformer are made separately operable, such other reason being that with some tire-casings a considerable amount of power must be used to accomplish the inversion of the tread of the tire-casing at the same time that the casing is being spread by or held spread by the bead-engaging hooks.

The damaged portion of the casing having been discovered and repaired, or if the injured part is to be renewed elsewhere, the casing is by hand rolled back over roller 44 into the cradle and the latter and its load is allowed to descend to the floor by actuation of pedal 42 which permits escape of the air from the companion cylinders 36, 36 whose expulsion therefrom by their pistons is due to the weight of the cradle and its contents forcing them down.

The cradle having been thus restored to its original low or floor position, the tire-casing is easily and readily rolled out thereof by the operator.

In the case of light-weight, relatively-thin tire-casings, such as are commonly used on passenger-cars, it is not always necessary or desirable to lift them into place by actuation of the cradle, since they can with facility be elevated into position on the rollers 43 and 44 by hand and be maintained upright by bearing sidewise against the standard 74, whereupon all of the benefits afforded by the inspection and examination appliance can be availed of to advantage.

By using two, horizontal, crosswise cylinders 49 and their associated pistons 54 to actuate the spreader-hooks, at least two distinct advantages accrue.

They can be positioned at a higher elevation with relation to the locations where the hooks engage the casing-beads than would be possible were a single cylinder and piston employed directly beneath the center of the casing-tread with the beneficial result that the power is applied to the hooks approximately in line with their direction of travel and space is also provided for the ram-operated inverter or casing deformer.

The other advantage is that less power is required to actuate the spreader-hooks when the operating force is so applied.

Those skilled in this art will readily appreciate that the invention, as defined by the appended claims, is not necessarily limited and restricted to the precise and exact details of structure and function herein set forth and that reasonable modifications may be resorted to without departure from the heart and essence of the invention and without the loss or sacrifice of any of its material benefits and advantages.

I claim:

1. In a tire-casing spreader having means to support the casing in upright position, hooks engageable with the beads of the supported casing, and actuating-means for said hooks to temporarily spread their engaged portion of the casing, the novel improvement being that said actuating-means includes means at opposite sides of the tire-casing movable toward and from the supported casing and each having one of the hooks mounted thereon, a pair of parallel spaced-apart compressed-air cylinders, pistons in said cylinders, means connecting each cylinder to one of said movable-means and its piston to the other movable-means, and means controlling the admission of compressed-air into and its discharge from said cylinders.

2. The novel improvement set forth in claim 1 including the additional novel improvement of means associated with said two movable-means to equalize their travels toward and from the tire-casing.

3. In a tire-casing spreader having a base, means to support the casing in upright position,

hooks engageable with the casing beads, and operating-means for said hooks to temporarily spread their engaged portion of the casing, the novel improvements being that said operating-means includes upright members at opposite sides of the casing and hinged at their lower ends to the base of the spreader, a pair of horizontal elements fastened at the same height to said members, a pair of parallel spaced-apart cylinders, a pair of spring-retracted pistons operative in said cylinders, means connecting said cylinders and pistons to said elements, control-means to admit fluid under pressure into said cylinders simultaneously and to permit discharge of such fluid simultaneously from the cylinders, and means to equalize the movements of said hinged members, said hooks being mounted on and movable with said hinged members.

ROLLA G. STOEHR.