Nov. 6, 1934. C. L. EKSERGIAN ET AL 1,980,129

WIRE WHEEL TRUING MACHINE AND METHOD

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FIG. 1

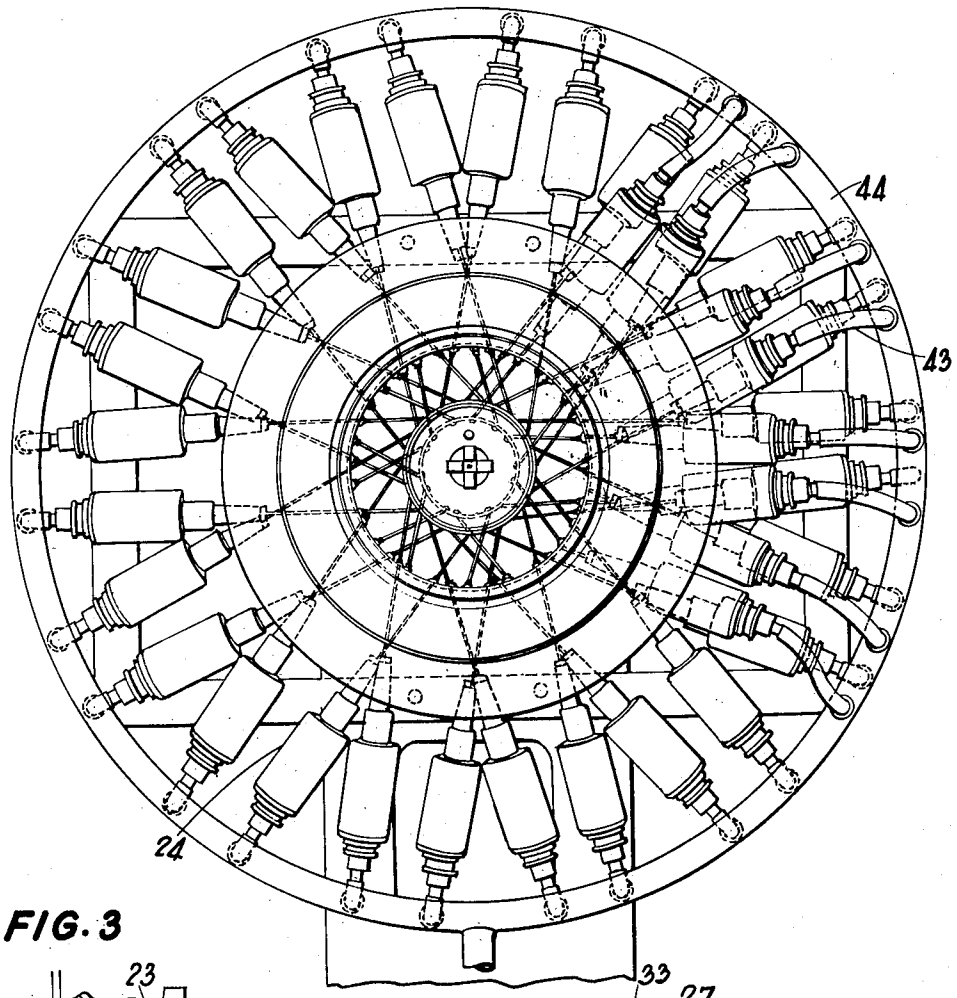
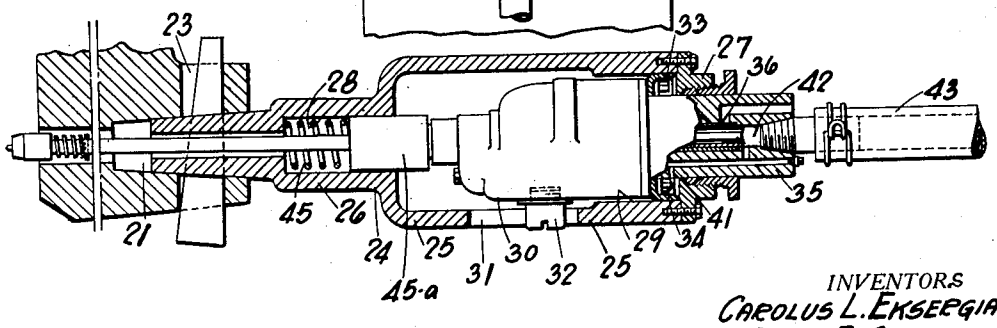


FIG. 3



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FIG. 2

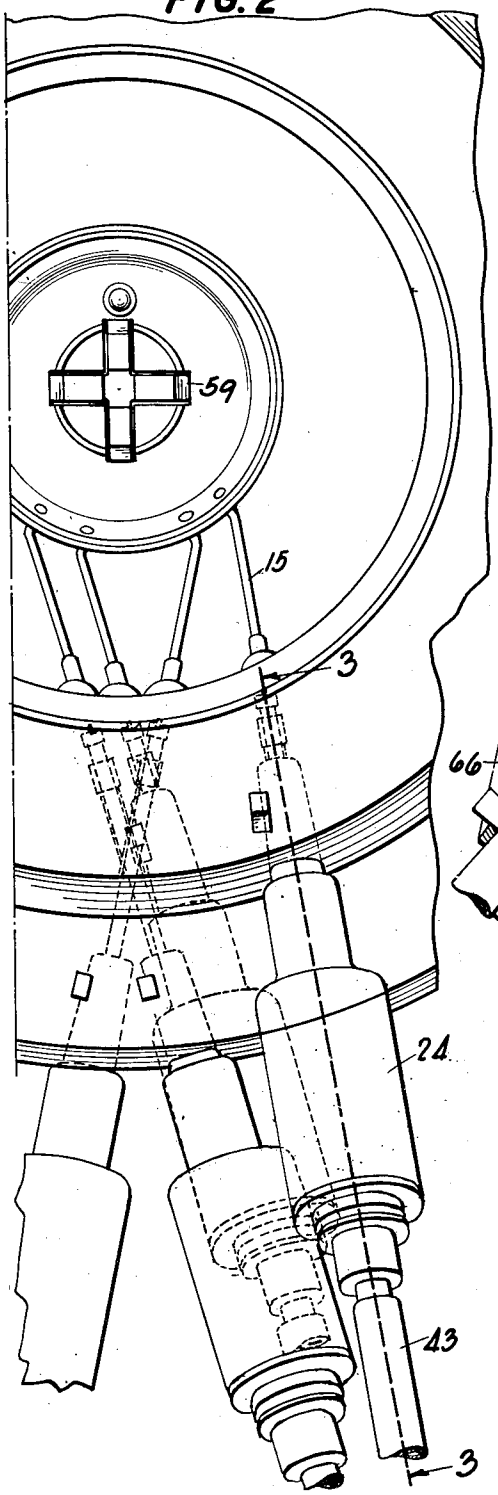
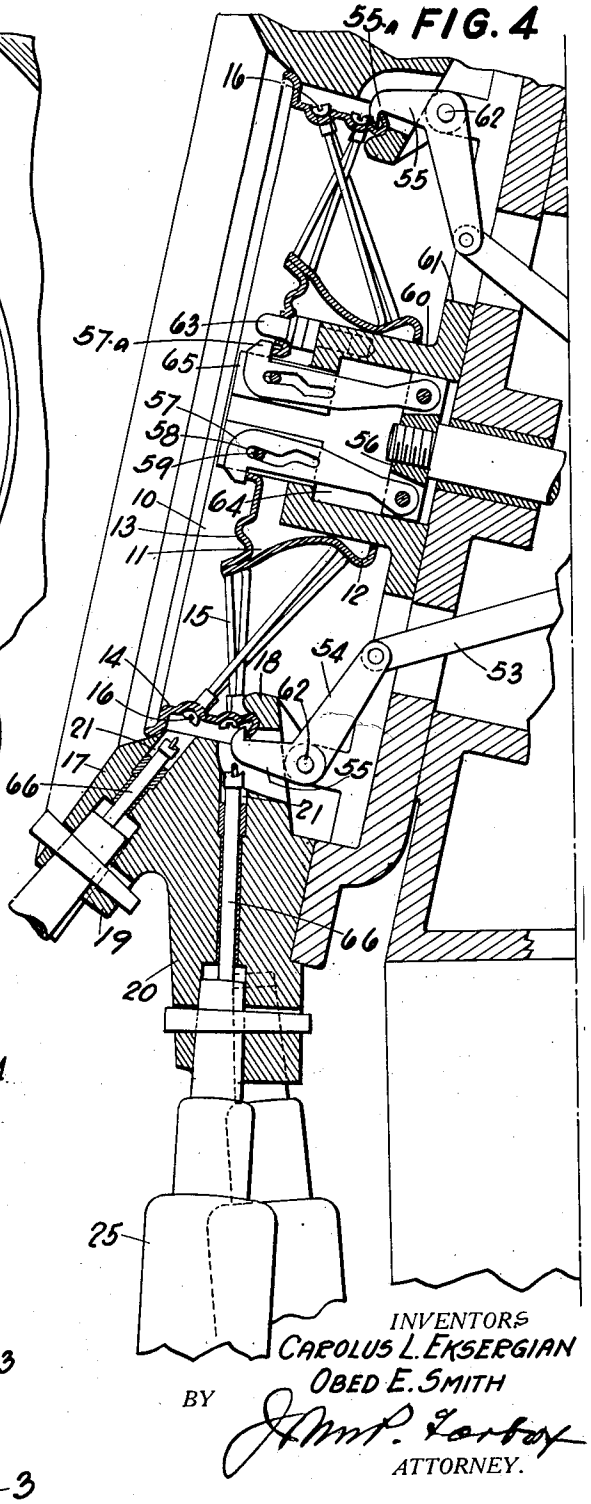


FIG. 4



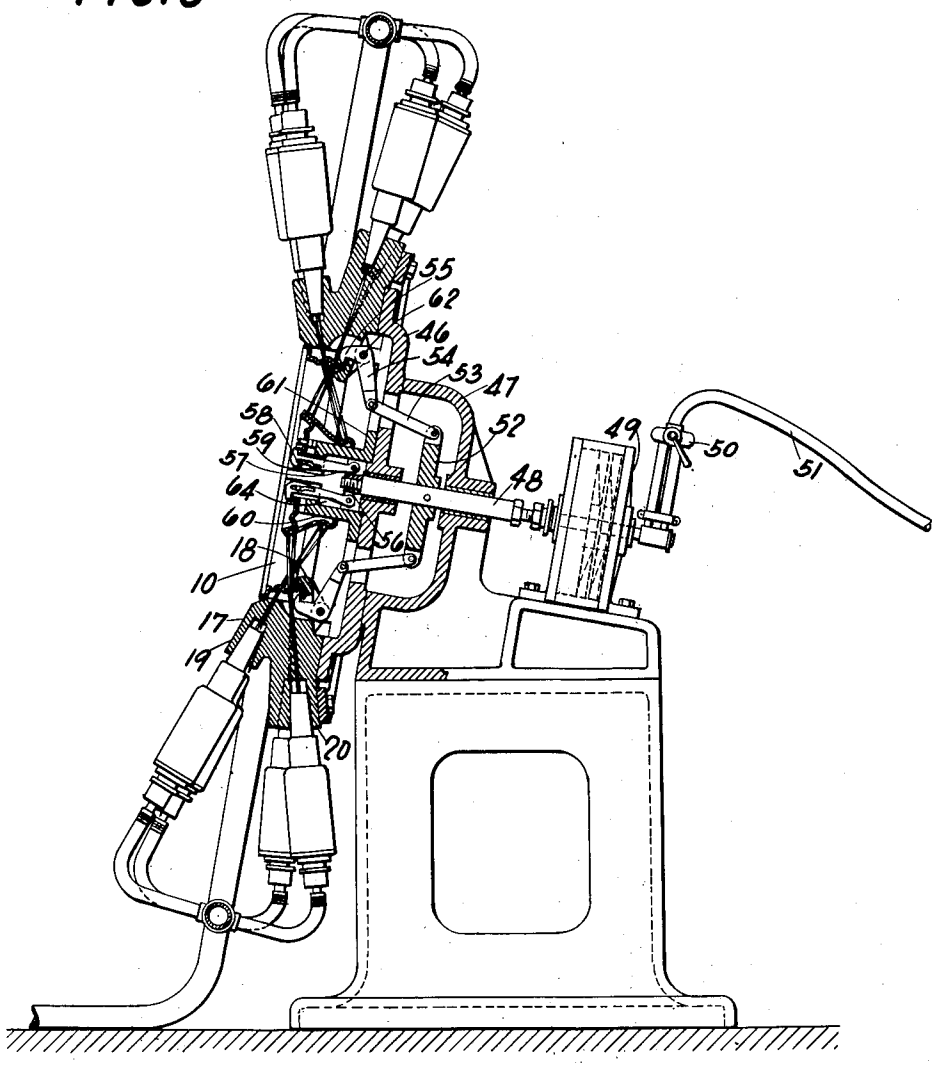
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FIG. 5



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FIG. 6

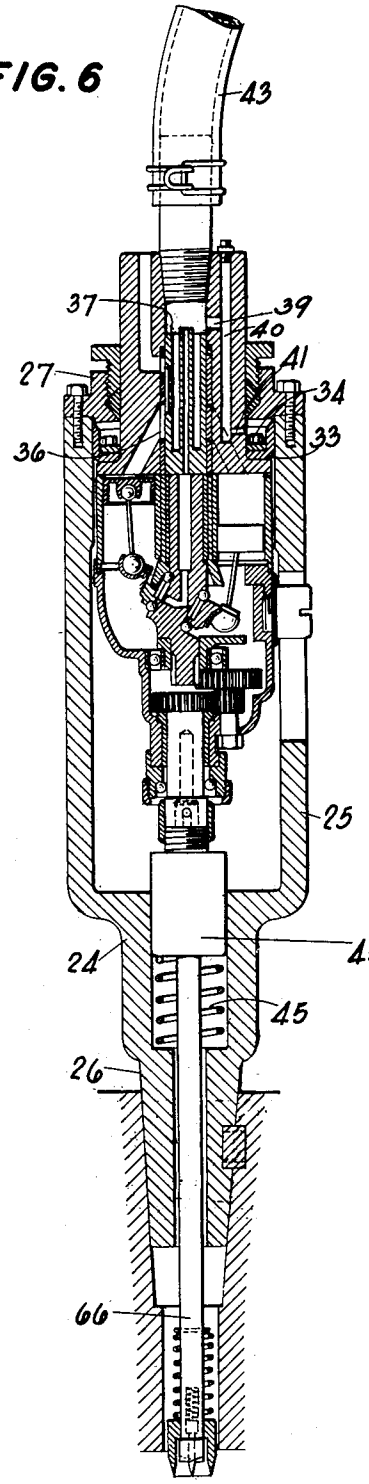
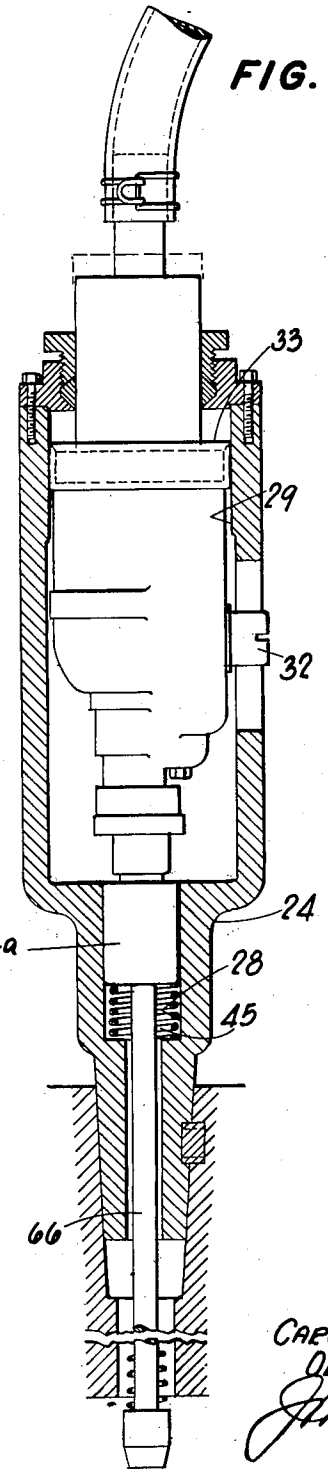


FIG. 7



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Patented Nov. 6, 1934 1,980,129

UNITED STATES PATENT OFFICE

1,980,129

WIRE WHEEL TRUING MACHINE AND METHOD

Carolus L. Eksergian and Obed E. Smith, Detroit, Mich., assignors to Budd Wheel Company, Philadelphia, Pa., a corporation of Pennsylvania

Application September 5, 1930, Serial No. 479,818

10 Claims. (Cl. 29—87)

Our invention pertains to the art of truing wire wheels and it has been our object to provide a machine and method for performing this operation which shall be simple, effective and inexpensive.

It has been a particular object of our invention to provide a machine for tensioning wire wheels in which an absolutely uniform tension is effected in every individual spoke, thereby insuring the trueness of the wheel. A further object of our invention has been to secure the hub and rim in rigid concentric relationship during the aforesaid tensioning operation.

We have further aimed to provide a machine which is adaptable to various types and sizes of wheels and designed in such a manner that its parts may be easily replaced.

A further object of our invention relates to a method and mechanism for mounting a plurality of individual spoke tensioning mechanisms in concentric relationship about a rigidly held wheel body and actuating these spoke tensioning mechanisms by yielding pressure simultaneously. The actuation of these mechanisms by yielding pressure insures an equal tensioning in each of the spokes, as the tensioning mechanism ceases to function as soon as the spokes attain a tension equal to that of the yielding force tending to tension them.

In order to secure the above advantages we have mounted a plurality of yieldingly operated motors in the nature of air drills about the periphery of the wheel and devised yielding mechanism to force them into engagement with the nipples of the spokes to be tensioned and rotate these nipples to tension the spokes equally. These motors are actuated from a common pressure source and are thus each subject to the same pressure. We are thus able to produce an equal tension in every spoke of the wheel.

Other objects and advantages of the invention will be obvious from a reading of the sub-joined specification in the light of the attached drawings in which—

Figure 1 is a front view of my improved machine.

Figure 2 is a detail view of certain of the spoke tensioning mechanisms.

Figure 3 is a cross section on the line 3—3 of Fig. 2, illustrating the method of mounting one of my improved air motors.

Figure 4 is a longitudinal sectional view of the head of my machine with parts omitted and parts shown in elevation for the sake of clearness.

Figure 5 is a central longitudinal sectional view of the entire machine with parts shown in elevation, and

Figures 6 and 7 are detail longitudinal sectional views of one of the air motors used in tensioning the spokes.

Referring to the drawings by reference characters the wheel to be tightened is most clearly shown in Figs. 4 and 5 and designated by the numeral 10. This wheel, in the form illustrated, comprises a hub 11 consisting of a main body 12 and an attaching flange 13 which may be secured to the main body of the hub by welding or other suitable means. The rim 14 is connected to the hub 11 by means of a series of spokes 15 which are provided on their outer ends with nipples 16 or other suitable securing means.

This wheel body is supported at a suitable point such for example as upon the gutter of its rim upon a flange 18 of an annular casting 17 and clamped thereto by suitable means to be described hereinafter. This casting 17 is also provided with a plurality of outer flanges 19 and 20 adapted to support the tools which are to be used in the tensioning of the spokes. These castings are provided with taper drilled passageways as indicated at 21 to receive removably the casings of the tools and these passageways communicate with cross passageways 23 adapted to receive a wedge shaped key to secure a fixed portion 26 of the tool casing in place adjacent the wheel.

This casing is designated in general by the numeral 24 and comprises a cylindrical main body portion 25 and a front portion 26 adapted to be secured in proximity to the work as above set forth. The casing is provided at its rear end with a head 27 which may be secured to the end of the casing body by bolts or other suitable means. The casing is machined at 28 and 29 to slidably receive cylindrical portions of the tool body. The tool for operating on the spoke nipples is indicated at 30 and in the form of the invention disclosed constitutes a commercial type of air motors. It drives in each case instead of a drill point, a nipple driver 66.

An important feature of our invention resides in the mounting of this air motor in such a manner that it is given a bodily reciprocation by the same yielding force which causes the actuation of the tool which tightens the spoke nipples. The casing 24 is cut away as indicated at 31 to receive a guide screw 32 or roller bearing which is secured to the body of the motor. By reason of this construction the motor may reciprocate bodily but it cannot receive a bodily rotation. The mo-

tor has a leather cup 33 secured to its rear end by means of a plurality of bolts 34. This leather cup effects an airtight joint between the motor and the cylindrical wall 29 of the casing.

The rear end of the motor is indicated at 35 and is provided with a sleeve valve 37 which rotates with the tool head and thus effects an intermittent opening and closing of the respective ports leading to the cylinders of the motor. A sleeve 36 is fixed with respect to the motor and has ports which communicate with the various ports in the sleeve valve 37 according to the point in the cycle of the operation, as is common practice in such motors. The conduit 43 communicates through passage 42 with air passageways 39—40 in the motor head which in turn communicate with a third air passageway 41 to admit air into the cylindrical body of the motor casing behind the leather cup 33. The flexible conduit 43 communicates with the main conduit 44 encircling and common to all of the motors.

According to our invention a plurality of these motors are arranged about the periphery of the wheel and operated simultaneously upon admission of the air to the main conduit 44. They are removed radially from the periphery of the wheel a sufficient distance to laterally clear them of each other when aligned with the nipple or spoke axes, as appears clearly in the plan views. Air is admitted by means of a two way valve thus providing for exhaust of the air within the cylindrical chambers behind the leather cups 33. Upon admission of air to the motors through the conduits 43 and 44 a portion of the air admitted flows through ports 39—41 and effects a forward movement of the motor within the casing. The nipple drivers 66 are thus moved into contact with the spoke nipples. Air from the main conduit also flows through other ports in the sleeve 37 through the sleeve 36 into and out of the individual cylinders of the motor as indicated in Fig. 6 thereby effecting a rotation of the tool in the well known manner. As the construction of this motor per se and its valve mechanism is well known and constitutes no part of my present invention, further description thereof is deemed to be unnecessary.

After the nipples have been tightened an amount corresponding to the pressure in the system, the motors stall individually and the pressure in conduit 44 is released and the air from behind the leather cups 33 exhausted through the port 38. This may be controlled by a two way valve (not shown) which controls the admission and exhaust of air to the system in a well known manner. A spring 45 provided within the chamber 28, and reacting in the front bearing 45ª and effects a reverse reciprocation of the drill in the casing upon the release of pressure.

We prefer to provide an operating tool for every nipple location on the wheel. The simultaneous tensioning of all the spokes obviates the difficulty commonly encountered in previous methods of spoke tensioning of pulling the hub shell away from its central location. As our improved machine and method involve a simultaneous tightening of all of the spokes of a wheel there is no tendency of the hub shell to be pulled from its central location. Our system also involves a further marked advantage over any previously evolved for this purpose in that the spokes are tightened by yieldingly exerted pressure which is equal upon every nipple. The nipples must therefore, of necessity, be equally tightened, (and the spokes also provide the torque, which torque developed by the motors in stall, is sufficiently in excess of the greatest abnormal nipple resistance per se to minimize its influence on spoke tension and that such torque is not great enough to stress any wheel parts affected beyond its elastic limit), for the tightening action will cease as soon as a pre-determined tension equal to the pressure of the system is attained on each successive nipple. However, with ordinary care the normal resistances of the nipples to turning can be maintained very nearly equal, and in such cases the spoke tensions are even more nearly equal. Our invention is therefore important, not only because it effects a simultaneous tensioning of the spokes, but also because this tensioning must of necessity be substantially equal upon every spoke, far more nearly equal than with any hand tightening method.

The casting 17 is removably secured to a circular mounting plate 46 which in turn is secured to the main framework 47 of the machine. A reciprocating shaft 48 operates in bushings in the mounting plate and framework and is secured at its lower end to a piston operating within a cylinder 49. The reciprocation of this piston within the cylinder is controlled by a two way valve 50 communicating with the upper and lower portions of the cylinder respectively. The valve 50 thus controls the reciprocation of the shaft 48 by controlling the flow of fluid from the conduit 51 to and from the cylinder 49. An annular head 52 is pinned to the shaft and this head is pivoted to a plurality of links 53 which are in turn pivoted to arms 54 constituting parts of the pivoted bell crank clamping levers 55 which are annularly arranged about the rim. They clamp the rim in position through its gutter or other suitable part upon the annular flange 18 of the casting 17, by hooking over the gutter when the levers 55 are oscillated.

A second head 56 is secured to the shaft 48 and is adapted to reciprocate within a chamber 64 in a sleeve 60. This sleeve is also provided with a flange 61 and arms adapted to receive the pivot pins 62 of the clamps 55.

The inner clamps 57 for the hub are pivoted to the head 56 and are provided with slots 58 which receive pins 59 secured to an upper flange 65 on the sleeve 60. The slots 58 are symmetrically offset intermediate their ends as respects the axis of shaft 48 and the clamps 57 are thus oscillated by the reciprocatory motion of the head 56. The outer ends of clamps 57 are shaped at 57ª to hook over the inner periphery of the bolt hole flange of the wheel. The sleeve 60 is also provided at its outer end with a plurality of centering pins 63 with conical seating shoulders adapted to be received within the bolt hole openings of the hub flange of the wheel and thus maintain the wheel in properly centered position.

It will thus be seen that we have provided means for securely clamping both the hub and rim members in concentric relationship with each other and at the same time securing them firmly in position for the tensioning operation. A movement of the valve 50 effects a reciprocation of the shaft 48 and a consequent simultaneous movement of the clamps 55 inwardly and the clamps 57 outwardly, the former to hook by ends 55ª over the rim gutter and clamp it on its centering seat 48, and the latter to hook by ends 57ª over the inner periphery of the bolt hole flange of the hub shell and clamp the flange firmly down onto the centering bolt hole studs 63.

In the operation of the machine a wheel having the spokes secured in place and the nipples loosely attached to the outer ends of the spokes is first placed in position upon the flange 18 of the annular casting 17. The valve 50 is then manipulated to effect a clamping of the hub and rim members in their respective positions. The main control valve of the machine (not shown) is next manipulated to admit air under pressure to the main conduit 44 and within every one of the conduits 43 simultaneously. This effects a simultaneous forward movement of every one of the motors within its casing and a simultaneous rotation of every one of the nipple driver tools 66 operated thereby. This rotation continues with respect to every tool until that tool has effected a tension in the spoke upon which it operates which corresponds to the pressure in the system. As every tool operates upon its respective spoke in this same manner, the tension upon all of the spokes will accordingly be the same. When the tensioning operation has been completed, the master valve for the conduit 44 is again manipulated to allow a reverse reciprocation of the motors and the expulsion of air from behind the cup 33. After the return of the motors to their initial position, the valve 50 is manipulated to force the shaft 48 upwardly and thus release the wheel. The completely tensioned wheel may now be removed and a new one inserted in its place, whereupon the cycle of operations is repeated.

It will be obvious to those skilled in the art that our invention is not necessarily limited to a machine in which nipples of the particular type here shown are used. The nipples or tightening threads might, for example, be associated with the inner ends of the spokes and the spokes tensioned by the manipulation of suitably formed heads formed directly upon the outer ends of the spokes.

It will also be obvious that our improved drill casing arrangement may be used in other connections, such for example, as in the drilling of the rim to produce holes for the spokes or in other similar simultaneous rotary operations. We do not therefore wish to be limited to the particular application of this improved arrangement disclosed in the drawings, and we have accordingly attempted to express in the claims the generic spirit of our invention.

Various other modifications will be obvious to those skilled in the art and we do not therefore wish to be limited in the subjoined claims except as interpreted in the light of the generic spirit of our invention.

What we claim is:

1. The method of truing a vehicle wheel consisting of a hub member, a rim member, a plurality of circular series of spokes interconnecting said hub and rim, which comprises simultaneously and uniformly tightening by equalized fluid pressure all of the spokes of each given series individually.

2. The method of truing a vehicle wheel consisting of a hub member, a rim member, a plurality of circular series of spokes interconnecting said hub and rim, which comprises simultaneously and uniformly tightening by equalized fluid pressure all of the spokes of all of said series.

3. The method of truing a vehicle wheel consisting of a hub member, a rim member, a plurality of spokes interconnecting said hub and rim which comprises simultaneously and uniformly tightening all of said spokes individually by equalized fluid pressure.

4. A machine of the class described comprising means for clamping a vehicle wheel consisting of hub and rim members interconnected by a plurality of circular series of spokes and means for simultaneously tightening by equalized fluid pressure all of the spokes of one of said series individually while the wheel is so held.

5. A machine of the class described comprising means for clamping a vehicle wheel consisting of hub and rim members interconnected by spokes and means for simultaneously tightening by equalized fluid pressure all of said spokes individually while the wheel is so held.

6. A machine of the class described comprising means for clamping a vehicle wheel consisting of hub and rim members interconnected by a plurality of circular series of spokes and yielding means for simultaneously tightening by equalized fluid pressure all of the spokes of one of said series individually while the wheel is so held.

7. A machine of the class described comprising means for clamping a vehicle wheel consisting of hub and rim members interconnected by a plurality of circular series of spokes, and fluid pressure operated means for simultaneously and by equalized pressure tightening all of the spokes of one of said series individually while the wheel is so held.

8. A machine of the class described comprising means for clamping a vehicle wheel consisting of hub and rim members interconnected by a plurality of circular series of spokes provided with nipples, and pneumatic means for simultaneously and by equalized pressure tightening all of the spokes of one of said series individually while the wheel is so held.

9. A machine of the class described comprising means for supporting a hub and rim and spokes loosely connecting the hub and rim, means for clamping said hub and rim to said support, means for tightening screw threaded elements associated with the spokes connecting said hub and rim, said tightening means including a tool rotated by fluid pressure to tighten each of the screw threaded elements, and means for supplying fluid at the same pressure to each of said tools.

10. A machine of the class described comprising means for supporting a hub and rim, and spokes loosely connecting the hub and rim, means for clamping said hub and rim to said support, means for tightening screw threaded elements associated with the spokes connecting said hub and rim, said tightening means including a tool rotated by fluid pressure to tighten each screw-threaded element, and means for supplying fluid at the same pressure to each of said tools including a main supply line encircling said tools, and short connecting lines between each of said tools and said main supply line.

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