(No Model.) 3 Sheets—Sheet 1.

J. KENNEDY.

TIRE ROLLING MACHINE.

No. 432,625. Patented July 22, 1890.

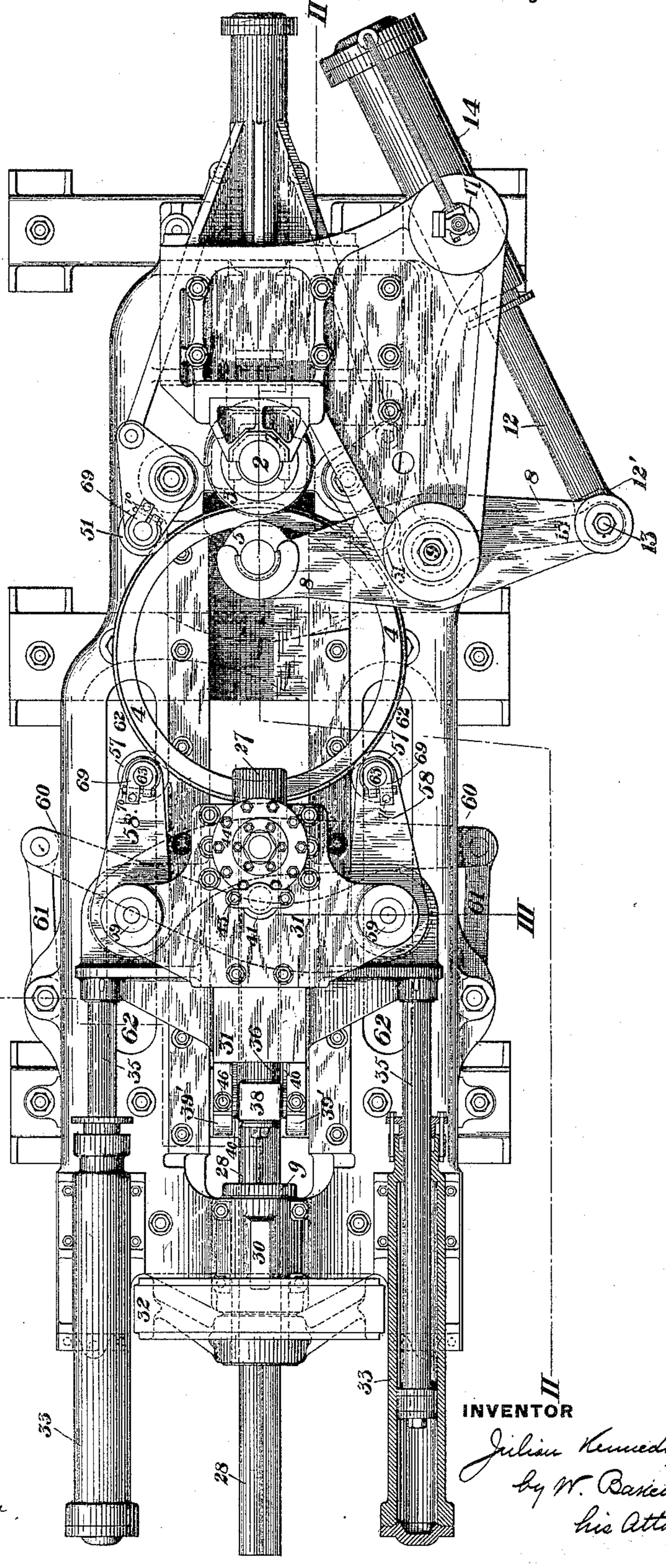


Fig. 1.

WITNESSES

A. L. Gill.

S. P. M. Corwin.

INVENTOR

Julian Kennedy

by W. Baskerville & Son

his Attorneys

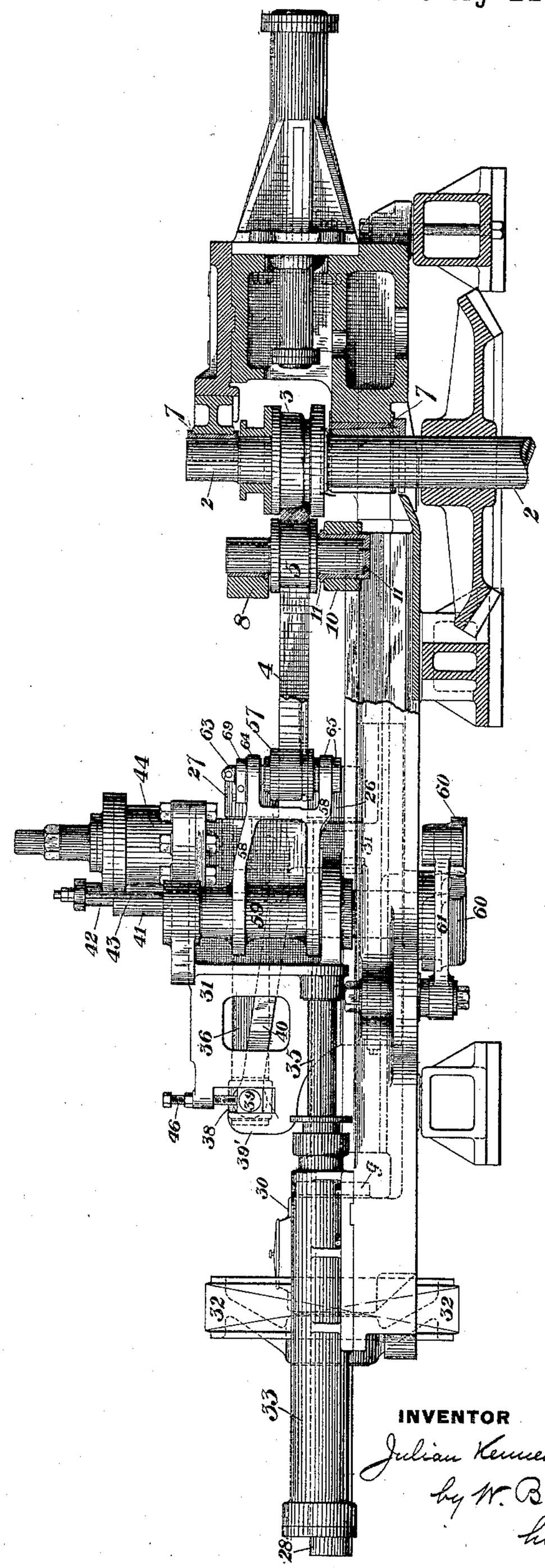
(No Model.) 3 Sheets—Sheet 2.

J. KENNEDY.

TIRE ROLLING MACHINE.

No. 432,625. Patented July 22, 1890.

Fig. 2.



WITNESSES

N. L. Gill.

J. M. Lawrence

INVENTOR

Julian Kennedy

by W. Bakewell & Sons

his Attorneys.

(No Model.) 3 Sheets—Sheet 3.

J. KENNEDY.

TIRE ROLLING MACHINE.

No. 432,625. Patented July 22, 1890.

Fig. 3.

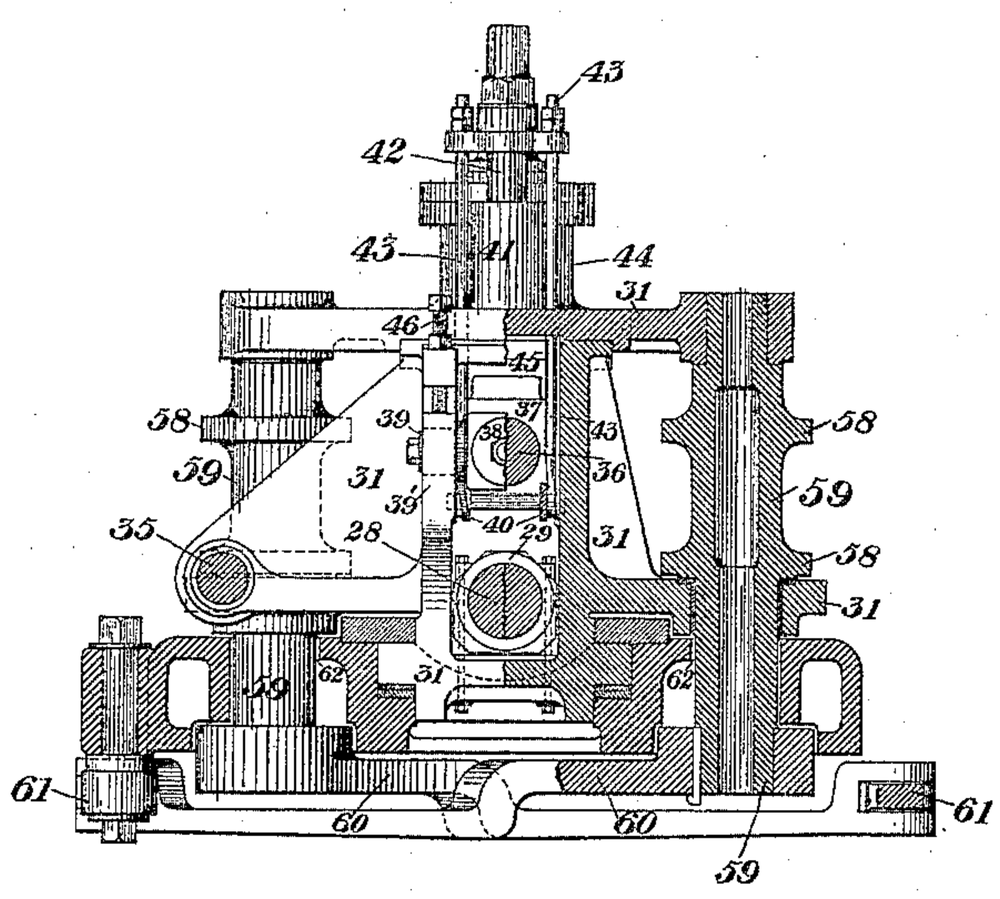
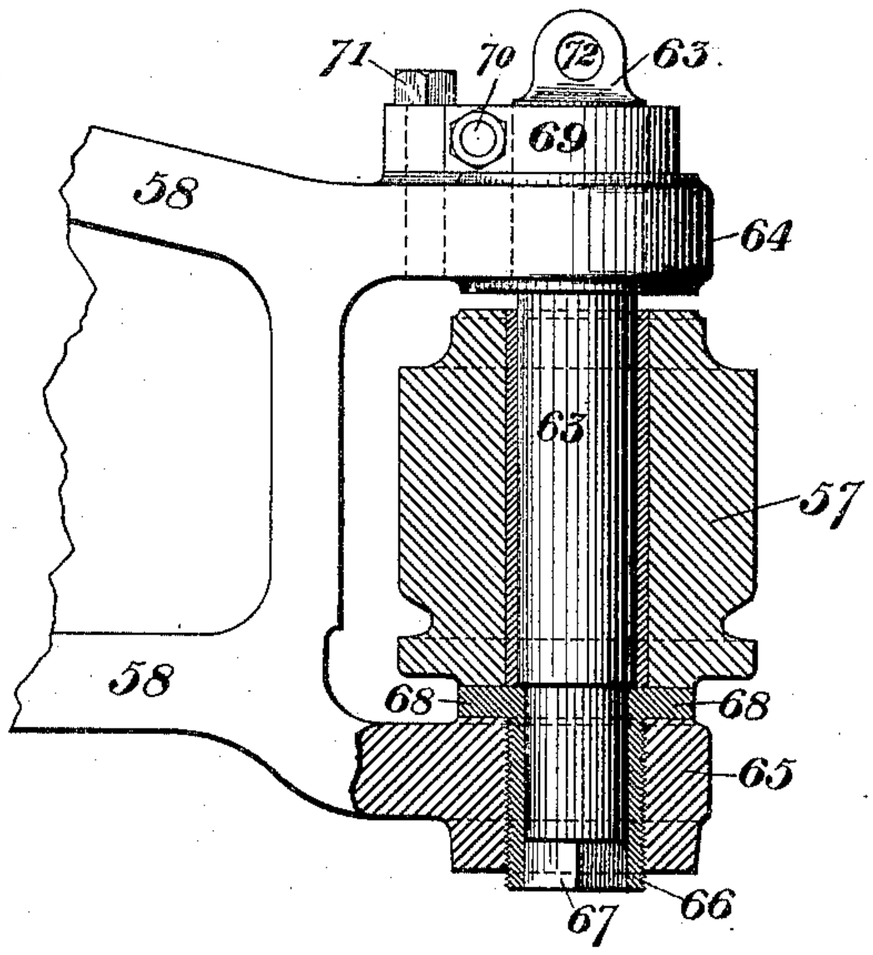


Fig. 4.



WITNESSES

A. L. Gill.
J. M. Lorrain

INVENTOR

Julian Kennedy
by W. Baxendell & Sons
his Attorneys.

UNITED STATES PATENT OFFICE.

JULIAN KENNEDY, OF LATROBE, PENNSYLVANIA.

TIRE-ROLLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 432,625, dated July 22, 1890.

Application filed April 7, 1890. Serial No. 346,883. (No model.)

To all whom it may concern:

Be it known that I, JULIAN KENNEDY, of Latrobe, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Tire-Rolling Machines, of which the following is a full, clear, and exact description.

My invention relates to an improvement in machines for shaping and rolling tires for the wheels of railway locomotives and cars from annular blooms.

The machine which I describe and show resembles in many respects a machine for which I obtained Letters Patent of the United States No. 403,431, dated May 14, 1889; but it embodies several improvements thereon. These improvements relate first to the arrangement and manner of operation of the guide-rollers, which bear against the outer periphery of the tire during the rolling operation and are advanced or retracted with the carriage and edging-rolls. If these guide-rollers be journaled in frames so that their axes are at all times at a constant distance from each other, the result is that although the rollers may be at proper distance from each other to bear against points on the periphery of the tire-bloom which, when the bloom is in its first stages of reduction, inclose between them a sufficient arc of the periphery to hold the bloom steady on the machine, yet when the diameter of the bloom enlarges the arc inclosed between the rollers becomes relatively smaller and insufficient to hold the bloom in the proper manner. It is therefore desirable that the guide-rollers should be provided with proper mechanism to cause them to diverge as the bloom increases in diameter to maintain substantially constant the number of degrees of arc between them; and my invention consists in improved means adapted to this end.

My invention also relates to an improvement in the mechanism for adjusting the guide-rollers, and this latter improvement is applicable not only to tire-rolling machines, but to many other forms of apparatus in which rolls are used.

I shall now describe the machine so that others skilled in the art may make and use the same, referring to my said patent for a more elaborate description of those parts which I do not claim specifically herein.

In the accompanying drawings, Figure 1 is a plan view of my improved machine. Fig. 2 is a side elevation thereof, partly in section, on the line II II of Fig. 1. Fig. 3 is a vertical cross-section on the line III III of Fig. 1. Fig. 4 is an enlarged vertical sectional view of one of the guide-rollers.

Like symbols of reference indicate like parts in each.

In the drawings, 2 represents the driven shaft of the main roll 3, which operates on the exterior periphery of the tire 4, and 5 is the roll which operates on the inner periphery thereof. The shaft 2 is journaled in suitable stationary bearings 7 on the frame of the machine, and is driven at the lower end by any suitable power-connections. There are two horizontal swinging carrier arms or levers 8 and 10, which are pivoted at the middle to a vertical post or pivot 9, which is suitably bolted or otherwise secured to the frame of the machine. These carrier-arms are independently rotary on the post 9, and are situated one at the level of the upper neck and the other at the level of the lower neck of the roll 5. The inner end of the lower arm 10 is made annular in form, so as to be adapted to receive and support a bearing 11 for the lower neck of the roll 5, and the inner end of the upper arm 8 is provided with a lateral cavity or recess faced with a suitable semicircular brass or bearing, which is adapted to fit against the upper neck of the roll 5. The outer end of the lower arm 10 has a lateral semicircular recess similar to that at the inner end of the arm 8, and the outer end of the upper arm 8 is pivotally connected by a pin 13 with the plunger 12 of a hydraulic cylinder 14, which pin 13 is also connected at the base with the base of the post 9 by a link 15. This pin 13 is a strong bar of metal encircled by a tubular collar 12′, which is attached to the end of the plunger 12 by a key. The connection of the arm 8 with the pin is directly above the collar 12′, and the cavity at the end of the arm 10 is adapted to embrace the pin 13 directly below the said collar. Both arms or levers 8 and 10 are therefore operated through the medium of this pin

by means of the rigid plunger, and the use of the common connecting-pin renders the action of the lever-arms uniform and preserves their exact parallelism even in case of the exertion of unequal strain upon them during the operation of the machine in rolling.

The link 15 is pivotally connected with both the pin 13 and the post 9 and is allowed free rotation on the latter.

The cylinder 14 is mounted on trunnions 17, so as to be rotatory horizontally.

26 and 27 are the edging-rolls, which operate on the edges of the tire. The lower roll 26 is fixed to the end of a rotary shaft 28, which is supported in suitable bearings 29 and 30. The bearings 29 at one end of the shaft back of the roll 26 are affixed to a horizontal sliding frame or carriage 31, which is mounted on the frame of the machine, and the bearings 30 are fixed to the stationary portion of the machine-frame. The shaft 28 is driven by a pinion 32, keyed to a sleeve *g*, which is fitted on the shaft with a feather and spline and revolves within the bearing 30, so that the shaft may move longitudinally with the sliding carriage 31 without disconnection from the pinion and sleeve, which are not susceptible of such longitudinal motion. The carriage 31 is adapted to be moved backward and forward by means of a suitable motor consisting, preferably, of hydraulic cylinders 33, mounted on the machine-frame, and having piston-rods 35, connected at the ends with the carriage.

The upper edging-roll 27 is arranged at the end of the shaft 36, the forward end of which is mounted in bearings 37 and the rear end of which is mounted in bearings 38. The bearings 38 are supported by lateral trunnions 39, which are suitably journaled in projecting wings 39′ of the carriage 31, so that the shaft 36 and its bearings 38 shall be oscillatory.

40 are radius bars or levers, which at one extremity are pivotally mounted on the trunnions 39, and at the other end are provided with lateral curved recesses, which fit beneath the curved tongues or projections at the base of the bearings 37. The bars 40 are upheld by a hydraulic cylinder 41, having a piston 42 and links 43, which connect the piston with the bars 40. The shaft 36 is movable and adjustable vertically by the cylinder 41 and its piston, by means of which the bars 40 may be raised and the shaft 36 thereby raised pivotally on the trunnions 39, as will be readily understood.

In order to depress the shaft 36, I employ a cylinder 44, having a piston 45, the lower end of which is made in form of a section of a cylinder, and which fits in a correspondingly-shaped socket on top of the bearings 37, so that as the shaft 36 is raised by the cylinder 41 there shall be no strain at the connection of the piston 45 with the bearings 37. The rear bearings 38 of the shaft 36 are adjustable vertically by any suitable adjusting device—such, for example, as the removable supporting-liners *a* and set-bolts 46, which I have shown in the drawings. These should be so adjusted that at the end of the rolling operation, when the tire has assumed its complete form, the roll 27 will be substantially horizontal.

I shall now describe generally the operation of so much of the machine as I have already described. The tires are made from annular blooms or ingots of metal in the manner which has long been practiced in the art. The roll 5, which operates on the inside of the tire, is set vertically in the bearing 11, which is supported at the inner end of the lower arm 10, as already described. The bloom having been properly heated is placed over and around the roll 5, which is not then encircled at the top by any bearings that would prevent the easy adjustment of the bloom. Water-pressure is now applied to the rear of the cylinder 14, so as to project the piston 12, the effect of which is to swing the upper carrier arm or lever 8 on its pivot 9, thus causing its inner end to advance and to engage the upper neck of the roll 5 and causing the pin 13 at the juncture of the piston 12 and lever 8 to engage the curved end of the lower lever 10. Then the further advance of the piston 12 will carry both levers 8 and 10, with the interposed roll 5, up to the stationary roll 3, pressing the bloom between these rolls, as illustrated in Fig. 2. Meanwhile the carriage 31 is caused to advance by means of the cylinders 33 until the roll 26 comes into position beneath the annular bloom, and the roll 27, which has been elevated by the cylinder 41, is then depressed upon the bloom by action of the cylinder 44, as before explained. The outer roll 3 is rotated by the driven shaft 2, and, as the bloom is kept pressed against this roll by the inner roll 5, the conjoint action of the two rolls upon the bloom reduces the latter and gradually increases its annular diameter, the rolls 26 and 27 meanwhile pressing on the edges of the bloom, reducing them to proper shape and effacing any incipient fins which may be formed on the edges by the rolls 3 and 5. The pressure of these edging-rolls upon the tire is regulated by action of the hydraulic cylinder 44, and as the tire increases in diameter the rolls 26 and 27 are correspondingly retracted by causing the cylinders 33 and piston-rods 35 to move back the carriage 31. This retraction of the carriage is maintained until the tire has been reduced by the action of the rolls to its proper diameter and shape. As the reduction proceeds the inner roll 5 is continually pressed forward toward the periphery of the outer roll 3 by the piston 12 of the hydraulic cylinder 14, which cylinder being oscillatory on its trunnions, as before explained, permits the free motion of the levers. When the tire has been rolled to its finished shape, the roll 5 is retracted from contact therewith by retracting the piston 12 of the

cylinder 14, thus disengaging the arm 8 from the upper neck of the roll 5. The arm 10 can then be drawn back by any suitable means to where its further retraction is prevented by its engagement with a stop on the machine-frame. The upper edging-roll 27 is then elevated by means of the cylinder 41 and piston 42, thus leaving the tire free to be removed from the machine by a crane or other suitable lifting device.

51 are the usual guide-rollers situate in proximity to the forming-rolls 3 and 5.

The parts of the machine which I have described above (except the motor for advancing the carriage 31) are substantially similar to those described and claimed in my said patent, and while I do not claim the same herein I wish it to be understood that the parts of the machine which I am about to describe, and which embody the other novel features of my invention, are not limited in their application to a machine of this type, but may be used on tire-machines of other forms of construction.

The guide-rollers 57, which bear on the exterior of the tire-bloom on the side opposite to the forming-rolls, are journaled in bearings at the outer ends of arms 58, which at their inner ends are fixed to or made integral with shafts 59, which are journaled in bearings on the carriage 31, so that the arms are capable of radial motion on the axes of these shafts, Figs. 2 and 3. The shafts extend to the under side of the frame of the machine through longitudinal slots 62, which are formed in the machine-frame for the purpose of permitting the longttudinal motion of the shafts with the carriage, and at their lower ends they are keyed to oppositely-extending arms 60, the outer ends of which are pivotally connected by links 61 with the frame of the machine. The arrangement of the arms 60, which cross each other and are curved so that they shall not interfere, is shown in Fig. 3. The parts 58 and 60 therefore constitute bell-crank levers, and the arrangement is such that if the carriage 31 be moved forward the restraining action of the links 61 on the arms 60 will cause a radial motion of the arms 58 and will move these arms toward each other, lessening the distance between the rollers 57, and if the carriage be moved back a reverse action will take place, the arms 58 being caused to diverge and to separate the rollers 57. These rollers, which bear constantly on the exterior of the tire-bloom as they are advanced or retracted with the carriage, are therefore caused to adjust themselves in respect of their lateral separation to the diameter of the bloom. As the bloom increases in diameter the rollers diverge, so that substantially the same number of degrees of arc is included between them. The mechanism which I have devised for this purpose is remarkably durable and reliable in its action.

The manner of journaling the rollers 57 in the arms 58, so that they shall be adjustable therein, is shown in Figs. 1, 2, and 4. 63 is a pin which is set in forked portions 64 and 65 of the arm 58, and at its lower end is inclosed by a bushing 66, which has a threaded shank fitting in a threaded socket in the lower part 65, so as to be vertically adjustable therein. A portion of the bushing 66 is made internally of squared or angular form to correspond with a squared or angular portion 67 of the pin 63, and at the top of the bushing is an annular flange 68, on which rests the base of the roller 57, which is journaled on the pin. At the outer end of the pin is an encircling-clamp 69, of divided annular form, the divided ends of which are connected by a screw-bolt 70, by tightening which the clamp may be caused to grasp the pin firmly and to prevent it from turning within the clamp.

71 is a locking-pin, which may be passed through one of the parts of the clamp into a hole in the arm 58, so as to prevent the clamp itself from turning.

When it is desired to adjust the roller 57 by raising it on its pin 63, the bolt 70 is loosened, so as to release the pin 63 from the grasp of the clamp 69, and then the pin is turned by means of a suitable tool, (which may be a bar inserted through a hole 72 in the pin,) the effect of which is to turn the bushing 66 in its screw-socket and to raise it therein. As this bushing forms the step or end bearing of the roller, its adjustment will also adjust the roller, and when the latter is brought into proper position it is held there by retightening the clamp 69. The clamp then holds the pin 63 from turning, and the pin holds the adjustable bushing 66.

The facility and accuracy of adjustment afforded by this device will be appreciated by those skilled in the art.

I claim—

1. In a machine for rolling annular blooms, the combination of guide-rollers which bear on the bloom, levers bearing the rollers, a carriage by which the levers are carried, and restraining mechanism acting on the levers and causing the divergence of the rollers conformably to the motion of the carriage, substantially as and for the purposes described.

2. In a machine for rolling annular blooms, the combination of guide-rollers which bear on the bloom, a carriage, bell-crank levers journaled on the carriage and having arms 60 situate on the under side of the carriage, and restraining-links 61 connected therewith, substantially as and for the purposes described.

3. In a machine for rolling annular blooms, the combination of guide-rollers which bear on the bloom, a carriage, bell-crank levers journaled on the carriage, and shafts connecting the arms of the bell-crank levers and extending through slots in the machine-frame, substantially as and for the purposes described.

4. The combination, with a roll, of a pin on which the roll is journaled, an adjustable

screw-step or end bearing to which the pin is connected, and means for holding the pin, substantially as and for the purposes described.

5. The combination, with a roll, of a pin on which the roll is journaled, an adjustable screw-step or end bearing to which the pin is connected, a clamp for the pin, and a lock for the clamp, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 29th day of March, A. D. 1890.

JULIAN KENNEDY.

Witnesses:
W. B. CORWIN,
THOMAS W. BAKEWELL.