(No Model.) 2 Sheets—Sheet 1.

A. PATERSON.

AXLE COLLAR PRESS.

No. 385,371. Patented July 3, 1888.

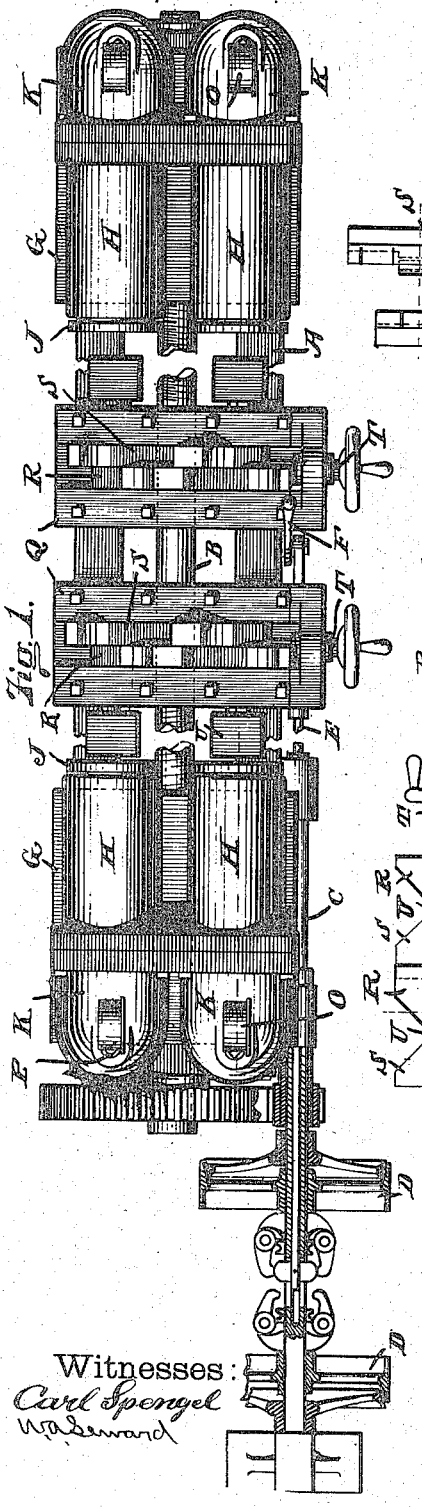

Fig. 1.

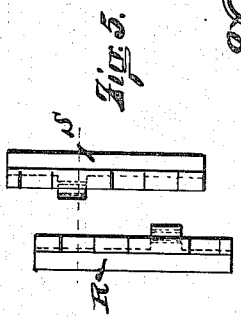

Fig. 5.

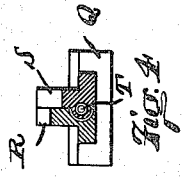

Fig. 4.

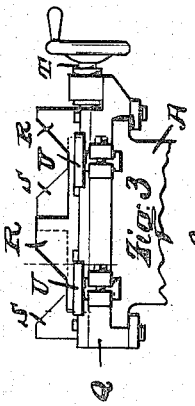

Fig. 3.

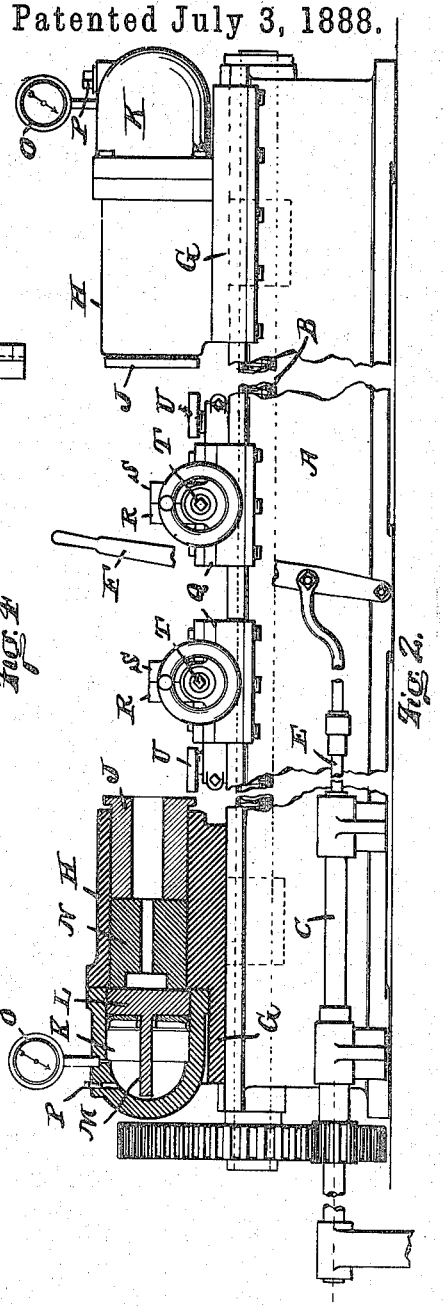

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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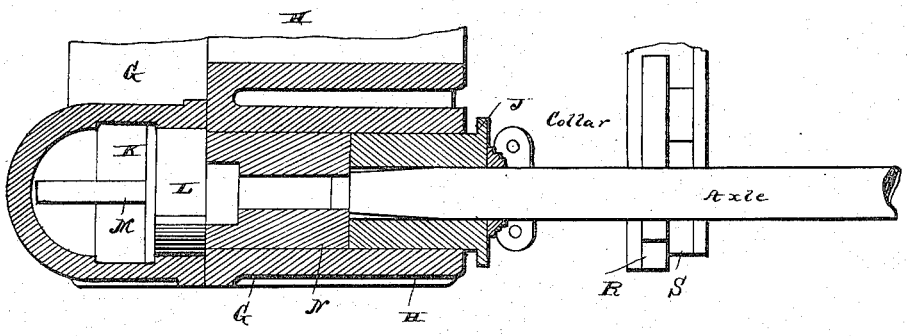
Fig 6



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AXLE-COLLAR PRESS.

SPECIFICATION forming part of Letters Patent No. 385,371, dated July 3, 1888.

Application filed March 5, 1888. Serial No. 266,248. (No model.)

To all whom it may concern:

Be it known that I, ANDREW PATERSON, of McKeesport, Allegheny county, Pennsylvania, have invented certain new and useful Improvements in Axle-Collar Presses, of which the following is a specification.

This invention pertains to a machine designed, primarily, for forcing the collars upon vehicle-axles. The particular form of axle in mind is of tubular construction, with tapering spindles at each end to receive the wheels, the spindles terminating, as usual, in threaded nipples for the reception of the axle-nuts. At the inner termination of each taper a collar is firmly fixed upon the axle, such collar forming one of the shoulders for the wheel, while the axle-nut furnishes the other shoulder. These collars are secured in place by being forced onto the axle under heavy pressure. Sometimes the collars are simple round collars, sometimes round with square bodies to the rear of them, and sometimes with ears for attaching them to the vehicle parts, the character of collar varying often with a proposed special application of the axle. When the collar is in place, its outer face must be a definite distance from the shoulder of the nipple of the axle. The force employed in applying the collars must be sufficient to insure integrity of attachment, and provision must be made against an excessive force which would tend to bend the axle, and care must be taken not to bruise the threads upon the nipples.

My improved machine will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a plan of my improved axle-collar press, the driving-shaft appearing in horizontal section; Fig. 2, a front elevation of the same with one of the forcing-cylinders shown in vertical longitudinal section; Fig. 3, an end view of a portion of the body of the machine, showing the side of one of the rests for supporting the axles while being operated upon; Fig. 4, a front view of one of the rests Q, exhibiting the rest-jaws in vertical transverse section; Fig. 5, a plan of a pair of rest-jaws in proper relation to each other, except that they have been separated sidewise to exhibit their inwardly-projecting nuts; and Fig. 6, a plan of one end of an axle, shown in relation to its rest-jaws and forcing-plungers, the cylinders and plungers appearing in horizontal section, this view, however, showing the axle-collar as having just reached its ultimate position.

In the drawings, A indicates a horizontal bed of sufficient strength to meet the pressing strains, and having its top formed with longitudinal guideways to permit the sliding of certain parts; B, a heavy screw journaled longitudinally in the bed, near its top, and provided near one end with a left-hand thread and near the other end with a right-hand thread; C, a hollow driving-shaft disposed in front of the bed and geared to the screw; D, a pair of friction-clutch pulleys on the driving-shaft, the intention being that these pulleys shall be driven by belts in opposite direction, and, preferably, one at greater speed than the other; E, a clutch-rod passing through the hollow driving shaft, and serving as a means for shifting the cone which engages and disengages the friction-pulleys, the disposition of this rod within the driving-shaft being, of course, non-essential, it being only desired that the rod should be connected with the clutch mechanism, so as to serve as a means for throwing either one of the clutches into action, as desired; F, a hand-lever disposed conveniently to the front of the machine and connected with the clutch-rod, this lever being the means by which the clutch-pulleys are engaged when it is desired to revolve the screw in one direction or the other; G, a pair of saddles, one sliding upon each end of the bed, each saddle carrying a nut engaging its appropriate portion of the screw; H, a pair of sockets or cylinders formed upon each of the saddles, the pairs of sockets facing each other; J, a plunger separably inserted in each socket and provided with a flange to limit its inward motion, the plunger having a bore adapted to neatly but freely admit the spindle end of the axle on which the collars are to be pressed, the length of the plunger corresponding with the length of the spindle from nipple-shoulder to collar-face when the collar has reached its proper place upon the axle; K, a strong water-cylinder forming an outer extremity for each of the sockets H; L, a piston fitted in each of these water-cylinders and provided with proper

packing to resist hydraulic pressure; M, a stop-piece projecting from each of these pistons toward the end wall of its water-cylinder, and serving as a means for limiting the recession of the water-piston; N, an intermediate plunger, one for each socket H, disposed within the socket and extending from the outer face of the piston to the inner face of the plunger J, this intermediate plunger having a bore adapted to permit the axle-nipple to freely enter and permit the nipple-shoulder of the axle to come properly against the end of the intermediate plunger within the bore of the plunger J, the rear of the bore of the intermediate plunger being truly counterbored; O, a pressure-gage, one for each water-cylinder, connecting with the water-cylinder, and serving as a means for indicating the hydraulic pressure within the water-cylinder; P, a plugged filling-hole for each water-cylinder, to serve in filling the water-cylinders with water; Q, a pair of rests disposed across the central portion of the bed of the machine and fitted for sliding adjustment along the same; R, a jaw-piece, one for each of these rests, fitted to slide in the rest transverse to the bed of the machine, this jaw-piece having two upward projections presenting inclined faces toward the rear of the machine, the distance between these two inclined faces corresponding with the distance from center to center of the two sockets H of a pair; S, a similar jaw-piece disposed alongside each of the jaw-pieces R and similarly provided with upward projections, the inclined faces of these upward projections, however, presenting themselves toward the front of the machine, whereby the inclined faces of the two jaw-pieces are caused to form a pair of V-shaped notches immediately below the axial line of the press-cylinders; T, a screw, one for each rest, journaled in the rest and extending lengthwise of the rest centrally between the jaw-pieces R and S, this screw having a right-hand thread at one end and a left-hand thread at the other end, the right-hand thread being engaged by a nut formed upon one of the jaw-pieces, while the left-hand thread is engaged by a nut formed upon the other jaw-piece, whereby when the screw is turned the two jaw-pieces slide lengthwise in opposite direction; U, a vertically-adjustable gage-table, a pair for each of the rests, this gage-table being supported by the rest in a position between the rest and the appropriate press-cylinder, and immediately below the axial line of the press-cylinder.

The length of the machine is to be such that when the two pairs of pressing-cylinders are moved apart the axles may be laid upon the rests. In other words, the distance between plungers J, when moved apart, must exceed the length of axle to be operated upon.

The rests Q are to be adjusted and fixed upon the bed at such distances from each other that the gage-tables U will correspond to the position of the collars to be placed upon the axles. The gage-tables are to be vertically adjusted to such height that when the axis of an axle being operated upon coincides with the axis of the cylinders operating upon it the collar or plunger or other proper part of the collar will rest upon the table-gages. By turning the screws T the V-shaped notches formed by the jaw-pieces will be widened or narrowed, and the inclined jaw-surface will form tangents of a circle of greater or less diameter. The jaw-pieces should be so adjusted that the notches will support the cylindrical axles, so that their axes correspond with the axes of their pressing-cylinders. The V shaped notches thus serve to determine the vertical position and sidewise position of the axle, while the gage-tables U serve as surface for determining the plane of the flanges or ears or lugs or what not upon the collars which are to be pressed upon the axles. By throwing the lever F in one direction one of the friction-pulleys will be thrown into engagement with the driving-shaft, and consequently the screw B will be revolved, and the saddles G, with their cylinders, will be moved forcibly in a direction, say, toward each other. By throwing the lever F in the other direction the reverse motion of the parts will take place, and the press will open to permit the removal and placing of axles. The screw is the direct pressing means, and it is desirable that the speed of the driving-pulleys be so arranged that the opening motion of the parts will be a more rapid one than the closing or pressing one.

The machine as illustrated is for operating upon two axles at one time.

The rest portion of the machine having been adjusted to the work in hand, as heretofore indicated, and the cylinder K being full of water, the machine is ready for operation. The collars are slipped upon the axles as far as they will go, and the axles are then laid in the V-shaped rest-notches, with the collar-ears or analogous collar portions brought into the same plane by resting upon the gage-tables. This leaves the two axles in line with the bores of the plungers J. The lever F is now thrown into proper direction to produce the pressing motion. The saddles G slide toward each other, the plungers J going over the nose of the axles, until finally the exposed faces of these plungers come in contact with the collars on the axle. The pressing motion continues, the collars becoming forced farther upon the axles, until finally the nipples of the axles enter the bores of the intermediate plungers, N, and the faces of these plungers come in contact with the nipple-shoulders of the axles, whereupon the hand-lever is to be thrown, so as to open the press and permit the removal of the axle and the placing of others.

It will be noticed that the only thing to prevent the retreat of the plungers J within their sockets during the pressing operation is the water behind the piston L. This water will, therefore, become subjected to pressure, and the degree of pressure will be indicated by the pressure-gage. Knowing the desired mini-

mum pressure with which the collars are to be applied, and knowing the area of the piston L, we may fix upon a gage-indication of pressure per square inch which will correspond to the minimum force with which we wish to apply the collars. Should any collar go to its final position without the appropriate minimum pressure being indicated by the gages, it is evident that the collar is too loose, and the work can be rejected or marked for remedy. The two collars on an axle may not require equal force for their seating, as one may be a trifle looser than the other. The separate gages serve as means for determining the pressing force employed in seating each individual collar.

It is obvious that if one collar upon an axle goes on easier than the other collar upon the same axle the easy-going collar will be the first one pressed to its position, and the hard-going collar will not be pressed to its appropriate position until the nipple-shoulder at the easy-going end of the axle has come in contact with the face of its intermediate plunger, N. When such contact occurs, the easy-going collar has reached its proper position, and the entire axle is then pressed toward the hard-going collar. Finally, all of the collars have reached their exact proper position upon the axles; but the pressing motion would obviously tend toward continuance, and thus might injure the axles by bending, and might also injure the gages by overpressure and bring improper strains upon the machine. The water in the water-cylinders being non-compressible, it is obvious that the piston L will have an inconsiderable retreating motion during the pressing operation. The intention is, that they shall only retreat sufficiently to produce an indicating pressure upon the water, and a stop put upon this retreating motion by the gages M coming in contact with the back walls of the water-cylinders. The pistons can therefore retreat sufficiently to cause the gages to indicate the pressure, but can do little more than this before the pressure becomes exerted through the stop-pieces precisely as if there were no water present. The friction-pulley which produces the friction motion is to have its clutch mechanism so adjusted that when the desired maximum of pressing force has been reached the friction-clutch will slip and cause the approach of the pressing elements to cease. This maximum force should come within the limit of force to which it is considered wise to subject the axles at endwise pressure.

It is desirable that the faces of the plungers J, which bear against the collars during the pressing operation, should have as much bearing-surface upon the collars as possible. Various sizes of axles are to be operated upon, and therefore plungers J should be selected having bores to conform properly to the diameter of the axle-spindle. Furthermore, the length of the plungers J from their face to the face of the intermediate plungers, N, represents the exact distance to which the axle-collars are to be set from the nipple-shoulders. Therefore plungers J should be selected and used having a length appropriate to the work in hand. These plungers J are merely bored cylinders slipped within the forward ends of the sockets and provided with frontal flanges, which may be taken hold of by hand in removing the plungers. Appropriate sets of the plungers being at hand, the press may be provided with those having bores and lengths appropriate to the work to be done.

The intermediate plungers, N, come in contact with the nipple-shoulder only after their appropriate collars have reached final position upon the axle, and thereafter the axle becomes pushed upon by the appropriate intermediate plunger, N, the corresponding collar no longer changing its position upon the axle. The pressure of contact between the intermediate plunger, N, and its axle end may be enormous, and great care should be taken to avoid this pressure being applied at the end of the threaded nipple of the axle, else the end of the nipple might become upset or the end thread destroyed. The strain should therefore be imposed upon the nipple-shoulder, and as this shoulder is rather shallow it is important that the bore of the intermediate plunger should be as small as is consistent with the free admission of the nipple. Axles with different sizes of nipple therefore call for the use of intermediate plungers with different sizes of bore. The intermediate plungers are simply bored cylinders slipping freely within the sockets. Appropriate sets of them being at command, proper ones may be readily employed. By withdrawing the plungers J the intermediate plungers may be withdrawn by means of a hook inserted through the bore and hooking into the counterbore.

My preferred construction is to have both of the saddles G, with the parts which they support, move upon the bed, though of course the same ultimate results will be produced if one of the saddles is secured to the bed and the other one is movable in performing the operations. A construction in which both of the saddles are movable requires less trouble in opening the press and in closing the press upon the axles, thus effecting an important saving in time, and it also permits of the axles, after being laid in the rests, maintaining substantially a fixed position throughout the operation. I also prefer the described construction providing for operations upon two axles at one time, though of course this is not essential. I also prefer the employment of the described screw arrangement as a means for applying the pressing force; but other well-known pressing means may obviously be employed to produce the forcible approach of the immediate pressing elements.

I claim as my invention—

1. In an axle-collar press, the combination, substantially as set forth, with means for holding an axle, of a socket arranged for forcible

movement longitudinally upon the end of the axle, a plunger fitted therein and adapted to go over the end of the axle and bear upon the collar to be pressed thereon, and a plunger to the rear of said plunger arranged to make contact at the end of the axle and limit the degree of advance of the axle within the socket.

2. In an axle-collar press, the combination, substantially as set forth, with means for holding an axle, of a socket arranged for forcible movement longitudinally upon the end of the axle, a plunger fitting said socket and adapted to receive the end of the axle and press against the collar, a water-cylinder arranged to the rear of said socket provided with a pressure-indicator, and a piston in said water-cylinder arranged to receive pressure from said plunger.

3. In an axle-collar press, the combination, substantially as set forth, with means for holding an axle, of a socket arranged for forcible movement longitudinally upon the end of the axle, a plunger fitting said socket and adapted to engage the end of the axle and the collar thereon, a water-cylinder to the rear of said socket provided with a pressure-indicator, and a piston in said water-cylinder arranged to receive pressure from said plunger and provided with a stop-piece to limit its retreat.

4. In an axle-collar press, the combination, substantially as set forth, with means for holding an axle, of a socket arranged for forcible movement longitudinally upon the end of the axle, a separable plunger fitting said socket, and having a bore suited to the diameter of axle being operated upon and having a length suited to the spindle length of the axle, and a separable plunger to the rear of said first-mentioned plunger, having a bore suited to the nipple of the axle being operated upon.

5. In an axle collar press, the combination, substantially as set forth, of a bed provided with means for holding an axle, a saddle fitted to slide on said bed and carrying an axle-forcing socket, a screw journaled in said bed and engaging said saddle, and a driving-shaft arranged for the transmission of motion to said screw, and friction-pulleys upon said driving-shaft.

6. In an axle collar press, the combination, substantially as set forth, of a bed, A, saddles G, fitted thereon, sockets H, carried thereby, means, substantially as described, for forcibly approaching the saddles, water-cylinders K, provided with pressure indicators and pistons, and plungers within the sockets adapted for engagement with the ends of the axles.

7. In an axle-collar press, the combination, substantially as set forth, of a bed, a saddle upon each end thereof fitted for sliding movement thereon, plunger-receiving sockets carried by said saddles and adapted to engage the ends of axles, and means, substantially as described, for moving the two saddles to and from each other.

8. In an axle-collar press, the combination, substantially as and for the purpose set forth, of a bed, saddles carrying sockets and plungers and fitted for movement thereon, means, substantially as described, for moving the saddles to and from each other, rests Q, supported by the bed between the saddles, jaw-pieces R and S, disposed in pairs alongside each other and fitted for sliding motion in the rests transverse to the bed, and provided with oppositely-facing inclined-upward projections, and screws T, for adjusting said jaw-pieces endwise with reference to each other.

9. In an axle-collar press, the combination, substantially as set forth, of a bed, saddles fitted to slide thereon and carrying sockets and plungers, means, substantially as described, for moving said saddles to and from each other, and vertically-adjustable gage-tables U, disposed below the axial lines of said sockets.

10. In an axle-collar press, the combination, substantially as set forth, of a bed, pressing-sockets carrying plungers and fitted for sliding movement on said bed, screw B, engaging said saddles, hollow driving-shaft C, geared to said screw, friction-clutches D on said driving-shaft, clutch-rod E, disposed in the hollow of said driving-shaft, and arranged, substantially as described, for operating said friction-clutches, and hand-lever F, for longitudinally shifting said rod.

11. In an axle-collar press, the combination, substantially as set forth, of a bed, a screw journaled therein, means, substantially as described, for rotating said screw in either direction, saddles G, fitted to slide on said bed and engaging said screw, sockets H, carried by said saddles and provided with plungers, rests Q, adjustably secured to said bed between said saddles, and rest-jaws R and S, carried by said rests.

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