July 17, 1928. 1,677,251

J. W. SAFFOLD

CHAIN TOOL

Filed Sept. 7, 1926 2 Sheets-Sheet 1

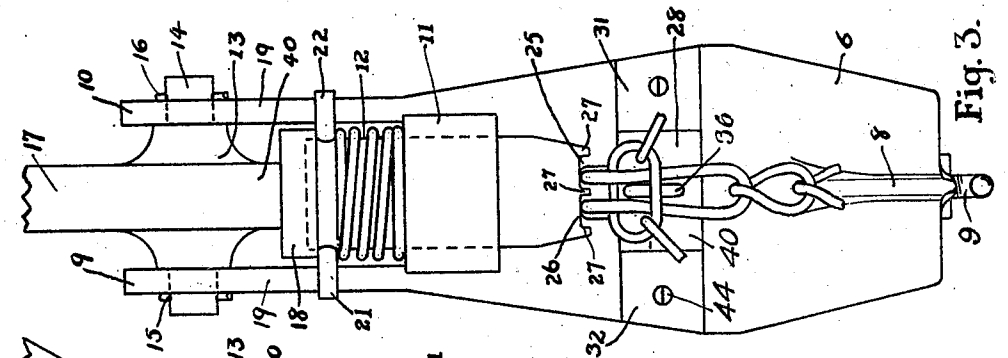


Fig. 3.

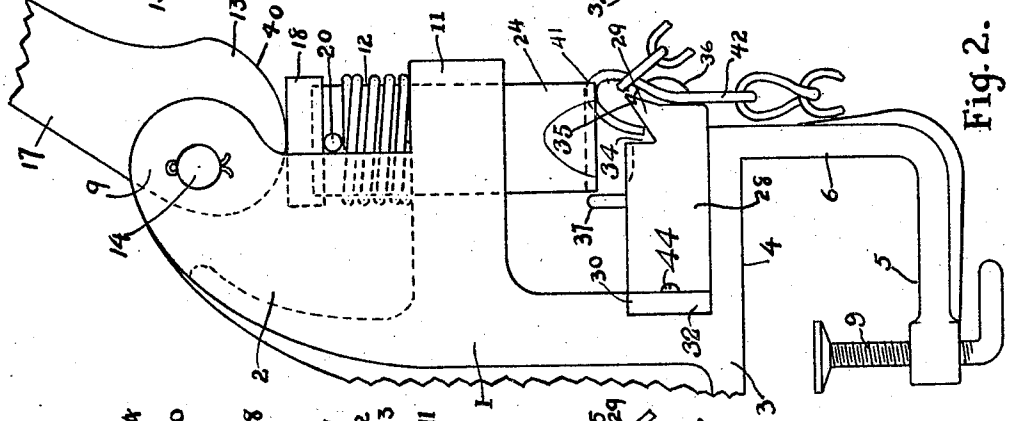


Fig. 2.

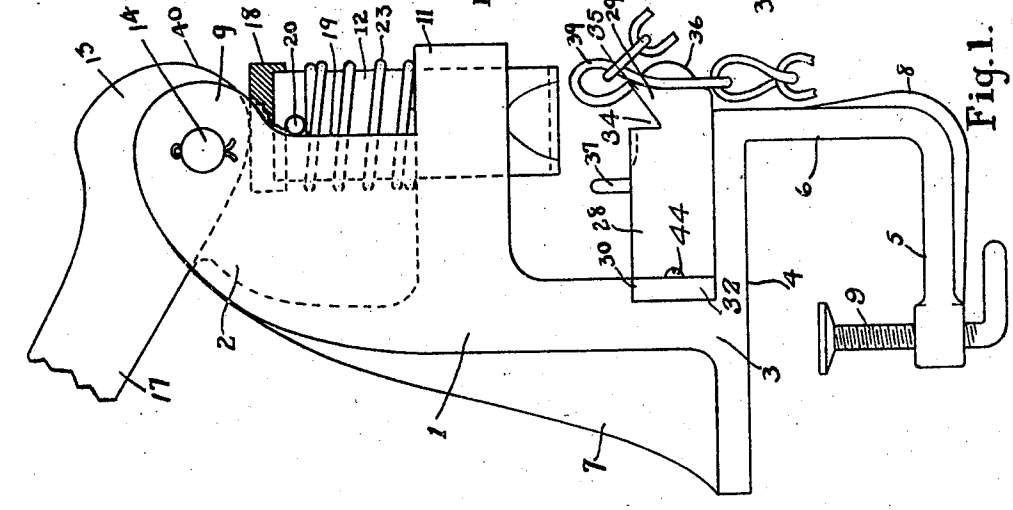


Fig. 1.

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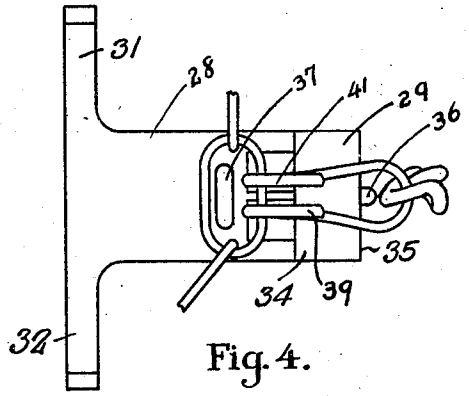


Fig. 4.

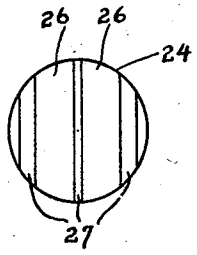


Fig. 7.

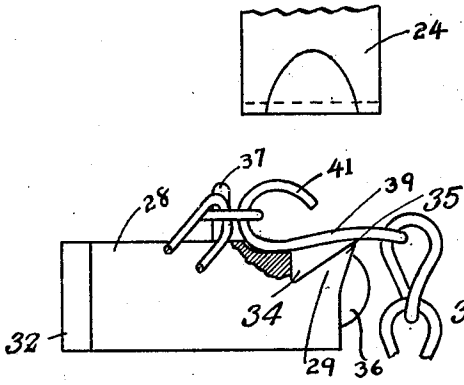


Fig. 5.

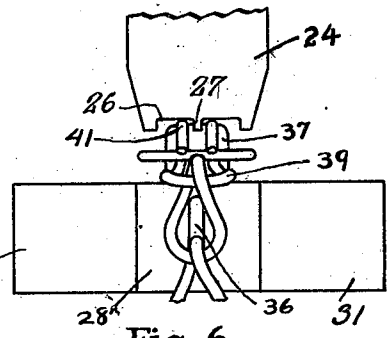


Fig. 6.

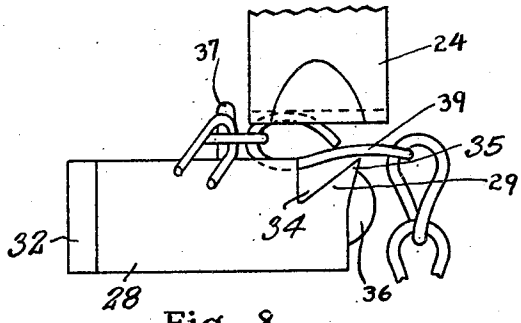


Fig. 8.

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Patented July 17, 1928. 1,677,251

UNITED STATES PATENT OFFICE.

JAMES WEBB SAFFOLD, OF CLEVELAND, OHIO.

CHAIN TOOL.

Application filed September 7, 1926. Serial No. 133,758.

My invention relates to improvements in chain tools and more particularly it relates to the type of chain tools adapted to open and close the eye portions of wire chain links.

One of the objects of my invention resides in the provision of an improved tool of the type referred to by the employment of which the attachment and detachment of cross links of automobile non-skid chains may be accomplished efficiently and expeditiously.

Another object of my invention resides in so constructing a tool of this type that the links of the chain being operated upon are retained in proper position in the tool during the eye opening or closing process without the aid of the operator's hands during the operation of the same.

Another object of my invention resides in a tool of the class described which may be capable of opening and closing the links of wire chains of varying sizes.

Another object of my invention is to provide an improved tool of the type referred to which may be operated by hand with a minimum effort, efficiently, economically and positively.

Another object of my invention resides in the provision of a tool of the type described, which is durable in construction and lending itself to ready replacement of wearing parts.

Other objects of my invention and the invention itself will become apparent from reference to the following specification wherein I have described certain embodiments of my invention and which embodiments are illustrated in the accompanying drawings forming a part of this specification.

Referring to the drawings:

Fig. 1 shows a side elevational view of an embodiment of my invention, illustrating the position of the same for operating on a chain link;

Fig. 2 shows a like view of the same in another operating position;

Fig. 3 shows a front elevational view of the embodiment of the foregoing;

Fig. 4 shows a top plan view of one of the tool jaws;

Fig. 5 shows a side elevational view of the same, a portion of which is shown in section;

Fig. 6 shows a front elevational view of the same;

Fig. 7 shows a bottom plan view of another jaw of the tool; and,

Fig. 8 shows a fragmentary view in elevation illustrating another operating position of the tool.

Referring to all the figures of the drawings in all of which like parts are designated by like reference characters, at 1, I show a tool press frame provided with an integral press head portion 2, base 3, and bench clamp 4 having a threaded aperture through an arm 5 supported by a depending portion 6, adapted to receive a clamping nut 9 to secure the chain tool on a supporting bench. The head frame portion and the clamp portion of the tool are suitably ribbed at 7 and 8, respectively, to strengthen the same and prevent distortion thereof during the operation of the tool.

The head frame terminates at its upper end in a pair of vertically disposed and preferably integral fork portions 9 and 10. 11 is an intermediate laterally projecting bearing portion for a plunger rod 12 adapted to be reciprocated on the frame by a cam 13. The cam 13 is journaled on a shaft 14 supported for rotation in oppositely disposed bearing openings 15 and 16 in the upright forks 9 and 10. Said cam 13 preferably terminates in an integral operating handle 17 adapted to be gripped by the hand of an operator to effect a reciprocatory motion to the plunger rod when desired. A detachable cap 18 is carried by the upper end of the plunger rod and adapted to be engaged by the cam when the same is rotated and thereby effect a communication of motion from the cam to the plunger to force the plunger downwardly.

The upright fork portions 9 and 10 of the head frame extend forward to a point slightly to the rear of the medial center line of the plunger rod, and are disposed parallel to each other so as to provide bearing surfaces 19 for a bar 20 projected transversely through the plunger rod and having projecting portions 21 and 22 adapted to ride upon the bearing surfaces 19 of the upright forks 9 and 10 to provide a guide of the plunger rod and thereby prevent any lateral tilting of the plunger rod during a reciprocation thereof when the cam is rotated. A retractile spring 23 is compressed between the lateral projecting portion 11 of the head frame and the bar 20 carried by the plunger rod 12

and is adapted to exert an upward force upon the bar 20 and thereby return the plunger rod to its normal elevated position.

The plunger rod terminates at its lower end in a die platten 24, preferably formed integral with the plunger rod and tempered to a higher degree of hardness than the remaining portion of the rod. A plurality of longitudinally forwardly extending grooves 25 and 26 are formed in the lower face of the die as best shown in Figs. 3, 7 and 8. The plurality of ribs or shoulders 27 are formed on the die by providing the grooves 25 and 26, one of the said shoulders being disposed between the grooves and the other of said shoulders forming the outer walls of the grooves. At 28, I show an anvil seated on the forward upper surface of the base 3, having a forwardly projecting portion 29 out of alignment with the line of travel of the die, and a rearwardly extending portion, projected below a shoulder 30 in the frame and secured to the frame by a plurality of machine screws 44, passing through apertures provided in flanges 31 and 32 in the rear of the anvil. The anvil 28 is provided with a wedge shaped recess 34 in a forward portion of its upper surface, and forwardly of the recess 34, the anvil terminates in an edge 35.

The front face 40 of the projecting portion 29 of the anvil is provided with a vertically positioned arcuate shaped forwardly projecting lug 36, disposed substantially equi-distant from the sides of the anvil. An upstanding lug 37 is provided on an upper face of the anvil and disposed with clearance space to the rear of the travel of the plunger and die, said lug being disposed on a horizontal plane and at right angles to the lug 36. By reference to Fig. 1 of the drawings it will be seen that I have illustrated the plunger rod 12 in its uppermost position which it assumes when the tool is not in use, the handle lever 17 extending upwardly and rearwardly of the head.

A chain link 39 is shown in Figure 1 vertically positioned on the wedge portion of the anvil with the free end of the eye opening process which will now be described. The lug 36 retains the link 39 in proper vertical position on the anvil, the adjoining links assume a position depending from the anvil and clear of the die downward travel. The operator now swings the handle 17 which in turn rotates the cam 13 on its bearings 15 and 16, whereby the cam face 40 engages the spacer cap 18 as best shown in Fig. 2 and in the position shown in this figure the die has been forced downwardly against the tension of the spring and the upper bends of the eye of the chain link are engaged by the transverse grooves of the die and a slightly continued rotation of the cam causes the chain link to be opened by forcing the free end of the eye downwardly along the upper face 41 of the wedge, the depending portion 42 of the link being retained in position about the lug 36, on the front face of the anvil during the eye opening process.

When it is desired to close the eyes of the chain links the adjoining links are hooked on to the open eye of the link and the link is then placed in a vertical position on the anvil as best shown in Fig. 6, with the free ends of the eye directed forwardly of the anvil. The eye of the link of the horizontal chain is placed over the lug 37 and retained in position thereby and the remaining adjoining links to the link about to be operated on depend from the anvil and assume a position out of the way of the travel of the die and plunger. The links are retained in this position during the eye closing process. In a manner similar to the operation of the tool for opening the eyes the plunger and die is moved in a downward direction into contact with the eye where the die engages the eye and a continued travel in a downward direction of the die closes the eye.

The cam face 42 of the cam is so formed and the cam so journaled in offset bearings in the head that merely a minimum of manual effort is required to effect a sufficient force in a downward direction to open the eye of a wire chain link positioned on the anvil as shown in Fig. 1 of the drawings. The shoulders 26 formed in the under face of the die prevent any lateral movement of the link being operated on. As shown in Fig. 6 of the drawings when the eye of the link is to be closed a light relation is had between the link and the die and its associate parts.

A spacer element of any desired thickness may be mounted upon the upper end of the plunger depending upon the force and length of the stroke to effect the opening or closing of the eye of the link desired.

I have illustrated my improved tool adapted for use as a vertically reciprocating tool. However, it is to be understood that the present invention may be altered without departing from the scope of the invention to admit the plunger and its associated parts to be reciprocated on a horizontal plane.

The lugs 36 and 37 are so positioned upon the surface of the anvil that they will not be contacted by the die when it is reciprocated for opening or closing the eye of a link.

Having thus described my invention in a single embodiment I am aware that numerous and extensive departures may be made from the embodiment herein illustrated and described without departing from the spirit of my invention.

What I claim is:

1. In a chain link tool adapted to open

the eyes of cross chain links of a tire anti-skid chain, the combination with a frame having an upstanding head, of a base, a transversely recessed anvil secured to the base, and a plunger adapted for reciprocation in a bored portion of the head towards and away from the anvil, said plunger terminating in a die at its lower end, said anvil having a wedge portion terminating in an edge offset relative to the medial line of the plunger, said anvil having lugs projecting from its top and side portions, said lugs adapted to enter the loops of the links adjoining the link whose eye is being operated upon during the eye opening or closing process, said lugs being so positioned upon the anvil that the die will not contact with the links which are held by the lugs.

2. In a chain link tool adapted to open the eyes of cross chain links of tire anti-skid chains, the combination with a frame having an upstanding head of a base portion and a clamp, a transversely recessed anvil secured to the base, and a plunger adapted for reciprocation in the head towards and away from the anvil, said plunger terminating in a die at its lower end, said anvil having a wedge portion extending forwardly and upwardly from the transverse recess terminating in an edge and being relieved on its forward face below the edge.

3. In a chain tool the combination with a frame having a bored head having a front wall guiding surface, and a base, of a die, a cam, an anvil having a wedged portion positioned upon the base, a plunger adapted for reciprocation through the bore in the head toward and away from the base, a coil spring adapted to normally retain the plunger in its upmost position, a removable cap for the head of said plunger adapted to communicate motion to the plunger, to move it in a downward direction responsive to rotation of the cam against the tension of the coil spring, and a transverse pin projecting through the plunger adapted to bear upon the said guiding front wall surface of the head, to prevent lateral displacement of the plunger during reciprocation thereof.

4. In a chain tool adapted to open the eyes of cross chain links of tire anti-skid chains the combination with a frame having an upstanding head having a substantially vertical bore, a base, said base comprising an anvil having a transverse recess on its upper face, a plunger adapted for reciprocation in the bore of the head towards and away from the anvil, said plunger terminating in a die at its lower end provided with grooves, said anvil having a wedge shaped portion terminating in an edge extending upwardly from the transverse recess, said edge disposed at a point out of alignment with the axis of the plunger and adjacent the forward portion of the die.

5. In a chain link tool adapted to open eyes of cross chain links of a tire anti-skid chain, the combination with a frame having an upstanding head, a base, a clamp for the base to secure it to a support, an anvil secured to the base, a plunger adapted for reciprocation in a bore offset in the head towards and away from the anvil, said plunger terminating in a die at its lower end and provided with a pair of transverse grooves, said anvil having a recess on its upper face, said pair of grooves and said recess being disposed at right angles to each other, said anvil having a wedge shaped portion terminating in an edge projecting upwardly and forwardly from the transverse recess and offset relative to the medial line of the plunger.

6. In a chain link tool adapted to open the eye of cross chain links of a tire anti-skid chain, the combination with a frame having an upstanding head, a base and a clamp therefor, an anvil secured to the base, a plunger adapted for reciprocation towards and away from the anvil in a bore of the head, said plunger carrying a die, said anvil comprising an upwardly extending wedge and lugs projecting from its top and side portions adapted to enter the eyes of links adjacent the link whose eye is being operated upon, said wedge adapted to be projected within the opening of the eye to be opened upon a compressive action thereupon by said die and wedge.

7. In a chain link tool adapted to open the eyes of chain links, the combination with a frame having an upstanding head having a bore, a base portion and a clamp, of a transversely recessed anvil secured to the base, and a plunger adapted for reciprocation in the bore towards and away from the anvil, said plunger comprising a die at its lower end and a removable shim cap at its upper end, said anvil having a wedge shaped portion terminating in an edge extending upwardly from the transverse recess and offset relative to the medial line of the plunger, lugs projecting from its top and side portions, said lugs adapted to enter the eyes of links adjacent the link whose eye is being operated upon during the eye opening or closing process, one of said lugs being disposed on the anvil to the rear of the travel of the plunger and die and adapted for use to retain an adjoining link in position during the eye closing process, the other of said lugs being disposed at right angles to the first mentioned lug and below the wedge shaped portion terminating in an edge of the anvil and adapted for use during the eye closing process.

8. In a tool adapted to open and close an eye of a link of a cross element for a tire anti-skid chain, the combination with a reciprocable plunger, an anvil comprising a

forward face terminating in an upper wedge edge, said face being recessed below said edge, a forwardly projecting lug extending from the recessed face adapted to be projected within a link adjacent to the link operated upon, said plunger and said anvil adapted to exert expansive or compressive action upon the eye of the link, said lug positioning the chain prior to such operation upon the link eye.

9. In a chain link tool, the combination with a press frame, comprising a head and a base, said base comprising a bed portion, an anvil seated on the said bed portion, a reciprocable plunger journaled in the head and movable towards and away from said anvil, said anvil comprising a forwardly disposed wedge horn and an anvil face portion laterally disposed from the said horn also in the forward portion of the anvil, said anvil face portion being grooved, said plunger having its lower face grooved, said anvil groove being disposed in vertical alignment opposite a groove of the plunger, said pair of grooves adapted to receive a chain link eye portion and adapted to compress the said link portion to close the eye when the plunger is moved toward the anvil.

10. In a tool adapted to open and close an eye of a link of a cross element for a tire anti-skid chain, the combination with a reciprocable plunger, an anvil comprising a forward face terminating in an upper wedge edge, said face being recessed below said edge, an upstanding lug from said anvil adapted to be projected within a link adjacent to the link operated upon, said plunger and said anvil adapted to exert expansive or compressive action upon the eye of the link, said lug positioning the chain prior to such operation upon the link eye.

11. In a tool for opening and closing the eyes of a chain link, the combination of a head, an anvil, a horn portion on the anvil, a plunger journaled for reciprocation in the head towards the anvil, a spring to retract the plunger, the under face of the plunger having means thereon to engage a link, and means for reciprocating the plunger, said link engaging means maintaining the link in alignment with the central axis of the plunger to receive the direct thrusts of the plunger during an operation on the link.

In testimony whereof I hereunto affix my signature this 19th day of August, 1926.

JAMES WEBB SAFFOLD.