UNITED STATES PATENT OFFICE.

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BELT CUTTING AND PUNCHING TOOL.

1,179,830.


To all whom it may concern:

Be it known that I, THOMAS J. HAYES, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Belt Cutting and Punching Tools, of which the following is a specification.

This invention relates to tools for cutting off the ends of round leather belting to form square ends adapted to be abutted together, for punching the belting near said ends to form holes for the reception of the legs of a staple-shaped wire coupling, and for clenching the legs of the coupling upon adjacent ends of the belting. A tool of this character in common use comprises a pair of jaws having opposed faces between which the belting is grasped, and cross levers fulcrumed together between the jaws, and so connected with the jaws that the faces thereof are moved toward and from each other by the levers and are maintained in parallelism with each other, one of the jaws being provided with a perforating punch and with a cutter projecting inwardly from the jaw and cooperating with a shearing edge at one end of a belt-receiving recess in the other jaw in cutting off the end of a length of belting interposed between the jaws, the jaws being provided with extensions formed to cooperate in clenching the belt coupling. Heretofore the cutter of a tool thus characterized has been rigidly attached to the jaw which carries it, and has been so arranged that its cutting edge is liable to be injured by contact with a belt coupling between said extensions and is not adapted to be ground away to any considerable extent to compensate for wear.

My invention has for its object to obviate these defects and to enable the cutter to operate with less resistance than heretofore.

The invention also has for its object to provide a tool of this character with improved means for stripping the belting from the punch, and for centralizing the belting relatively to the punch.

To these and other related ends the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings forming a part of this specification: Figure 1 represents a side elevation of a tool constituting a simple embodiment of my invention, the jaws being opened; Fig. 2 represents an edge view of the same; Fig. 3 represents an elevation of the opposite side of the tool, the jaws being closed; Fig. 4 represents a side elevation of the cutter detached; Fig. 4a represents a fragmentary view of a modification; Fig. 4b represents an enlarged section on line 4a—4b of Fig. 1; Figs. 5 to 12 inclusive show another embodiment of the invention; Fig. 5 represents a side elevation, the jaws being opened; Fig. 6 represents an edge view; Fig. 7 represents a side view, the jaws being closed; Fig. 8 represents an elevation of the opposite side, the jaws being closed; Figs. 9 and 10 represent respectively a side and an edge view of the cutter detached; Fig. 11 represents a section on line 11—11 of Fig. 5; Fig. 11a represents a plan view of the stripping member detached; Fig. 12 represents a section on line 12—12 of Fig. 5; Fig. 13 represents a side elevation of a third embodiment of the invention, the jaws being opened; Fig. 14 represents an edge view of the tool shown by Fig. 13; Fig. 15 represents an elevation of the opposite side of the tool shown by Fig. 13, the jaws being closed; Fig. 16 represents a section on line 16—16 of Fig. 13.

The same reference characters indicate the same or similar parts in all the views.

Referring first to Figs. 1, 2, 3 and 4: In the drawings, 12 and 13 represent the jaws of a belt-cutting and punching tool, said jaws being termed for convenience of description the upper and the lower jaw respectively, although it is obvious that the tool may be used with either jaw uppermost. 14 and 15 represent crossed levers fulcrumed together at 16 between the jaws, each lever having a longer and a shorter arm. The shorter arms of the levers are connected with the jaws by pivot studs 17, located in sockets in the jaws formed to closely fit the studs. The longer arms of the levers are engaged with the jaws by studs 18, located in longitudinal slots 19 in the jaws, the arrangement being such that when the levers are moved from the position shown by Fig. 1 to that shown by Fig. 4, the jaws are closed and are constantly maintained parallel with each other. The upper jaw has a punch 20 arranged to enter an orifice 20a in the lower jaw when the jaws are closed. The jaws are provided with coupling-clenching extensions 12a and 13a adjacent to the punch. The lower jaw is provided with a recess 30 to receive a portion
of the belting, the intersection of the wall of said recess with one side of the jaw forming a shearing edge.

The construction thus far described is well known and is not claimed by me, this embodiment of my invention relating to the improvements next described in the cutter, and to the means for stripping the belting from the punch, and for centralizing the belting for the action of the punch. The cutter, which is shown separately by Fig. 4, is composed of a blade 22 and an elongated shank 22a. Said shank has a longitudinal slot 23 at one end which receives a stud 24 fixed to the upper jaw. The opposite end of the shank has a socket or orifice 25 which receives and surrounds the stud 18 connected with the lever 14. Said studs 24 and 18 maintain the cutter shank in a position parallel with the upper jaw, and the slot 23 permits the cutter to be moved endwise on the upper jaw from the position shown by Fig. 1 to that shown by Fig. 3 when the jaws are closing, the cutter also moving with the upper jaw toward the lower jaw. The cutter has an oblique cutting edge 26 which projects from the upper jaw and is inclined relatively thereto, said edge being arranged to move in sliding contact with one side of the lower jaw and cooperate with the shearing edge on said jaw, in cutting a length of belting interposed between the jaws. The described movements of the cutter cause its edge to make an oblique shearing cut with the minimum expenditure of power. The arrangement of the cutting edge is such that it is guarded by the back 27 of the blade against contact with a belt coupling between the extensions 13a, 13b; hence there is no liability of injury to the cutting edge by the coupling. This arrangement also enables the cutting edge to project considerably below the upper face of the lower jaw when the jaws are closed, as shown by Fig. 3, so that the edge may be considerably reduced by repeated grindings without being rendered inoperative. The shank 22a is preferably provided with an additional slot 28 to receive the stud 17.

The above described belt-receiving recess 30 in the lower jaw coincides with the punch 20. A1 represents a belt-stripping member composed of a resilient metal strip attached at 32 to the lower jaw and having a free end portion projecting over the recess 30, said portion having an orifice through which the punch passes. The free end of the stripping member is adapted to bear yieldingly on the upper side of belting located in the recess and to strip the belting from the punch when the jaws are opened. The upper jaw is preferably provided with a stud 35 passing through an orifice in the stripping member and having a head 36 of greater diameter than said orifice and bearing against the under side of said member, the arrangement being such that when the jaws are opened the said lifts the stripping member from a belt in the recess 20. The free end of the stripping member is preferably curved to conform to the upper side of the belting on which it bears, and cooperate with the similarly curved recess 30 in holding the belting central relatively to the punch and preventing liability of punching the belting out of center.

The belt-receiving recess in the lower jaw may be angular, as indicated at 30a (Fig. 3), the free end of the stripping member being correspondingly formed.

The punch 20 is preferably oblong or elliptical in cross section, as indicated by Fig. 2, the longer axis of its cross section being parallel with the belt. I find that this form is better than a circular form, because it enables the punch to penetrate and withdraw from the belt with less resistance, reduces to the minimum the lateral bulging of the belt at opposite sides of the punched hole, and enables the punch to be secured in the socket provided for its reception in the upper jaw without liability of turning therein. Said socket may be formed by a groove 35 formed in the jaw 12, and a groove 45 formed in a plate secured to said jaw, as shown by Fig. 4.

The embodiment of the invention shown by Figs. 5 to 12 inclusive is distinguished from the simpler embodiment above described in the particulars next described.

The upper jaw 12 is provided with a fixed shearing edge 33 formed, as shown by Figs. 5 and 6, by the intersection of one side of the jaw with one side of the wall of a recess 33 formed in the jaw. The cutter 22 is provided at its upper edge with a wing or projection, one side of which is sharpened to form a movable cutting or shearing edge 35 adapted to cooperate with the fixed edge 33 in severing a piece of belting placed in said recess. I call the edges 33 and 35 supplemental cutting edges to conveniently distinguish them from the cutting edge 26 and the side of the jaw with which it cooperates. The object of these supplemental cutting edges is to sever the leading end of a length of belting wound on a spool, without punching the belting. The shank 22a of the cutter is provided with a curved extension 37 having an orifice 38 which receives a stud or pin 39 attached to the lever 14 at such distance from the fulcrum pin 16 that the closing movement of the jaws gives the cutter a greater longitudinal movement than is the case when the cutter shank is engaged with a pin 18, as shown by Figs. 1 and 3. The longitudinal movement thus imparted to the cutter is sufficient to cause the cooperation of the supplemental cutting edges 33 and 35. The
punch 20, instead of being immovably attached to the upper jaw as in the first described embodiment of the invention, is attached to a carrier 40 (Fig. 11), which is movable crosswise of the upper jaw 12 in a guide or socket 41 formed in said jaw, the punch being therefore adjustable toward and from the cutter 22, so that the fastener-receiving hole formed by the punch may be at a greater or less distance from the cut end of the belting, provision being therefore made for using fasteners of different sizes. The carrier 40 may be adjusted and held at adjustments by any suitable means. As here shown, an adjusting screw 43 is engaged with a tapped socket 44 in the jaw 12 above the guide 41, said screw having a shank projecting from one side of the jaw and provided with a flange 46 engaging a groove 47 in the carrier 40, and with a head 48 whereby the screw may be rotated to adjust the carrier and punch. The punch-receiving orifices in the jaws 12 and 13 and in the stripping member are elongated, as shown by Fig. 11, to permit the desired adjustments of the punch. The stripping member in this embodiment of the invention, instead of being formed on a resilient metal strip supported by the lower jaw as in the first described embodiment, is an arm 31 bridging the belt-receiving recess in the lower jaw and having a perforated ear 50 (Fig. 11a) attached to a sectioned stud, which is preferably composed of a lower section 51, the upper end of which bears on the lower side of said ear, and an upper section 52 having a reduced threaded lower end passing through the ear 50 and screwed into the section 51, the section 52 having a shoulder bearing on the upper side of said ear, which is thus clamped between the two sections. The lower section of the stud has a sliding fit in an orifice 53 in the lower jaw, and the upper section 52 has a sliding fit in an orifice formed in a threaded bushing 54 screwed into the upper jaw. The upper end of the upper section is threaded and is provided with a stop nut or nuts 55 held by a spring 56 against the upper side of said bushing. The spring surrounds the upper section 52 and bears at its upper end on the bushing 54, which constitutes a fixed abutment. The lower end of the spring bears on the ear 50 and acts to hold the stop nut 55 seated on the bushing 54, when the jaws are opened, the stripping member 31 being held yieldingly in its initial position bridging the mouth of the recess 30, as shown by Fig. 5. By turning the nut 55 the stud and stripping member may be slightly raised or lowered to give it the exact initial position shown, in case it is found that, owing to imperfections in the form and assemblage of the levers and jaws, the initial position of the stripping member requires adjustment, it being desirable that the stripping member and lower jaw shall stand in the relative positions shown by Fig. 5 when the jaws are opened. When the jaws are closing the spring acts to force the stripping member into the recess 30, as shown by Fig. 7, until the stripping member bears on a belt in said recess, the spring then yielding until the jaws are fully closed, and the outer ends of the stud sections being projected from the jaws to an extent determined by the diameter of the belt. When the jaws are opened the bushing 54 abuts against the nut 55 and raises the stripping member from the belt against the pressure of the spring. The lower stud section 51 is provided with a head 58, which abuts against a shoulder on the lower jaw when the jaws are fully opened, as shown by Fig. 12.

The described construction enables me to employ a spring 56 of sufficient length to exert pressure on the stripping member ahead of the punch and before the stripping member contacts with the belt, the pressure of the spring increasing as the punch enters the belt and causing the stripping member to effectively perform its function.

In the embodiment of the invention shown by Figs. 13, 14, 15, and 16, I have substituted for the rectilinearly moving cutter previously described, a cutter 60, which is pivoted at 61 to oscillate on the upper jaw, and has a curved cutting edge 62 adapted to cooperate with one side of the lower jaw, said cutting edge being eccentric to the center of oscillation. In place of the spring-pressed stripping member a fixed stripping member 63 may be employed, this being a curved bridge integral with or rigidly attached to the lower jaw and forming the top of a circular opening 64 formed to receive the belt. An arm or ear 65 on the cutter is pivoted at 66 to one end of a link 67 the other end of which is pivoted at 68 to the lever 14, the arrangement being such that when the jaws are opened, as shown by Fig. 13, the cutting edge 62 is outside the opening 64, and when the jaws are closed, as shown by Fig. 15, the cutting edge swings in a curved path entirely across said opening. The punch carrier 40 in this embodiment of the invention is provided with two or more grooves 70 (Fig. 16), either of which is adapted to receive the inner arm of a latch or detent 71, which is pivoted at 72 to the upper jaw. A spring 73, acting on the outer arm of said detent, holds its inner arm in engagement with a groove 70 in the punch carrier, which is adapted to be locked in different positions. The carrier is preferably held normally at one extreme of its movement by a spring 74 housed in a socket in the upper jaw and pressing outwardly on an arm 75 fixed to the carrier. It will be seen that in each of the de-
scribed embodiments of the invention, the belt cutting edge of the cutter projects from the upper jaw to cooperate with a shearing edge at one end of a belt-receiving recess in the lower jaw and has a compound movement due first to its connection with the upper jaw whereby the cutter is caused to move with said jaw toward and from the shearing edge of the lower jaw, and secondly to its connection with one of the levers constituting the jaw-operating mechanism whereby the cutter is given an additional movement either in a rectilinear path or in a curved path, while cooperating with said shearing edge. The said compound movement in either case reduces to the minimum the force required to impel the cutter through the belt.

In each embodiment of the invention the cutting edge cooperating with the lower jaw is guarded by the back of the cutter, because said back faces the open end of the space between the coupler-clenching extensions of the jaws and extends substantially across said space when the jaws are opened, so that it prevents a belt coupler in said space from touching the cutting edge.

Having described my invention, I claim:

1. A tool of the character stated, comprising an upper and a lower jaw, said jaws having opposed inner faces and the lower jaw having in its inner face a belt-receiving recess the wall of which intersects one side of the lower jaw to form a shearing edge, jaw-operating means maintaining the jaws parallel, a cutter movably connected with the lower jaw and bodily movable thereby, said cutter having a cutting edge projecting inwardly from the upper jaw and in sliding contact with the said shearing edge, and means connecting the cutter with the jaw-operating mechanism whereby an additional cutting movement is imparted to the cutter when the jaws are closing and while the cutter is cooperating with said shearing edge.

2. A tool of the character stated, comprising an upper and a lower jaw, said jaws having opposed inner faces including coupler-clenching faces, and the lower jaw having in its inner face a belt-receiving recess the wall of which intersects one side of the lower jaw to form a shearing edge, jaw-operating means maintaining the jaws parallel, and a cutter connected with and movable by the upper jaw, said cutter having a cutting edge projecting inwardly from the upper jaw and in sliding contact with the said shearing edge, and a back face the open end of the space between said extensions and arranged to guard said cutting edge.

3. A tool of the character stated, comprising an upper and a lower jaw, said jaws having opposed inner faces including coupler-clenching extensions and the lower jaw having in its inner face a belt-receiving recess the wall of which intersects one side of the lower jaw to form a shearing edge, jaw-operating means maintaining the jaws parallel, a cutter movably connected with the upper jaw and bodily movable thereby, said cutter having a cutting edge projecting inwardly from the upper jaw and in sliding contact with the said shearing edge, a back facing the open end of the space between said extensions and arranged to guard said cutting edge, and means connecting the cutter with the jaw-operating mechanism whereby an additional cutting movement is imparted to the cutter when the jaws are closing and while the cutter is cooperating with said shearing edge.

4. A tool of the character stated, comprising an upper jaw, a lower jaw having a belt-receiving recess, a punch carried by the upper jaw and arranged to enter said recess, an independently movable stripping member bridging the recess and apertured to receive the punch, and resilient means connecting the stripping member with the tool and permitting the stripping member to yield and hold belts of different sizes against the bottom of the recess when the jaws are closing.

5. A tool of the character stated, comprising an upper jaw, a lower jaw having a belt-receiving recess, a punch carried by the upper jaw and arranged to enter said recess, a spring-pressed stripping member bridging said recess and adapted to bear yieldingly on a belt therein, said member being formed to centralize a belt in said recess.

6. A tool of the character stated, comprising an upper jaw, a lower jaw having a belt-receiving recess, a punch carried by the upper jaw and arranged to enter said recess, a spring-pressed stripping member bridging said recess and adapted to bear yieldingly on a belt therein, and means carried by the upper jaw for raising said member when the jaws are opened.

7. A tool of the character stated, comprising an upper jaw, a lower jaw having a belt-receiving recess, a punch carried by the upper jaw and arranged to enter said recess, a spring-pressed stripping member bridging said recess and adapted to bear yieldingly on a belt therein, and means carried by the upper jaw for raising said member when the jaws are opened, said means having provisions for adjusting the stripping member to establish a correct initial position thereof.

8. A tool of the character stated, comprising an upper jaw having a stud guide, a lower jaw having a belt-receiving recess and a stud guide aligned with the stud guide in the upper jaw, a stripping member formed to bridge said recess, a stud attached
to said stripping member and projecting into said guides, and a spring arranged to exert downward pressure on the stripping member and stud, the upper end of the stud being provided with an adjustable stop member held yieldingly against the stud guide of the upper jaw by said spring.

9. A tool of the character stated, comprising an upper jaw, a lower jaw having a belt-receiving recess, and a punch carried by the upper jaw and arranged to enter said recess, the punch being oblong in cross section and arranged with the longer axis of its cross section parallel with a belt in said recess.

10. A tool of the character stated, comprising upper and lower jaws, a cutter carried by the upper jaw and having a cutting edge cooperating with the lower jaw, a punch movably connected with the upper jaw, and means for adjusting the punch crosswise of said jaw.

11. A tool of the character stated, comprising upper and lower jaws, a cutter carried by the upper jaw and having a cutting edge cooperating with the lower jaw, the upper jaw being provided with a punch carrier guide, a punch carrier in said guide provided with a punch arranged to enter said recess, and means for adjusting said carrier and punch crosswise of the jaw.

12. A tool of the character stated, comprising upper and lower jaws, crossed levers fulcrumed together between the jaws and engaged therewith to maintain the jaws in parallelism, a cutter having an elongated shank, and connections between the said shank, the upper jaw, and one of said levers, whereby, when the jaws are closed or opened, the cutter is moved with the upper jaw toward or from the lower jaw, and is also moved rectilinearly lengthwise of the upper jaw, the cutter being provided with a cutting edge projecting obliquely from the upper jaw and cooperating with the lower jaw and with a back arranged to guard the cutting edge.

13. A tool of the character stated, comprising upper and lower jaws, crossed levers fulcrumed together between the jaws and engaged therewith to maintain the jaws in parallelism, a cutter having an elongated shank, and connections between the said shank, the upper jaw, and one of said levers, whereby, when the jaws are closed or opened, the cutter is moved with the upper jaw toward or from the lower jaw, and is also moved rectilinearly lengthwise of the upper jaw, the cutter being provided with a cutting edge projecting obliquely from the upper jaw and cooperating with the lower jaw and with a back arranged to guard the cutting edge.

14. A tool of the character stated, comprising upper and lower jaws, crossed levers fulcrumed together between the jaws and engaged therewith to maintain the jaws in parallelism, a cutter having an elongated slotted shank which is pivoted to one of said levers and connected with the upper jaw to have a rectilinear longitudinal movement thereon, one end portion of said shank being fulcrumed to one of said levers, the cutter being provided with a cutting edge projecting obliquely from the upper jaw and cooperating with the lower jaw, and with a back arranged to guard the cutting edge.

15. A tool of the character stated, comprising upper and lower jaws, jaw-operating means maintaining the jaws parallel, a cutter having a cutting edge cooperating with the lower jaw, and a supplemental cutting edge cooperating with the upper jaw, and connections between the cutter, the upper jaw and the operating means whereby a compound movement is imparted to the cutter.

16. A tool of the character stated, comprising an upper jaw, a lower jaw, each of said jaws having a transverse belt-receiving recess and a cutting edge at one end of said recess, jaw-operating means maintaining the jaws parallel, a cutter carried by the upper jaw and having a lower cutting edge cooperating with the lower jaw, and an upper supplemental cutting edge cooperating with the upper jaw, and connections between the cutter, the upper jaw, and the jaw-operating means whereby a compound movement is imparted to the cutter.

In testimony whereof I have affixed my signature.

THOMAS J. HAYES.