A. M. BATES.

WIRE TYING TOOL.

APPLICATION FILED SEPT. 27, 1920.

1,436,637.

Patented Nov. 28, 1922.

2 SHEETS—SHEET 1.

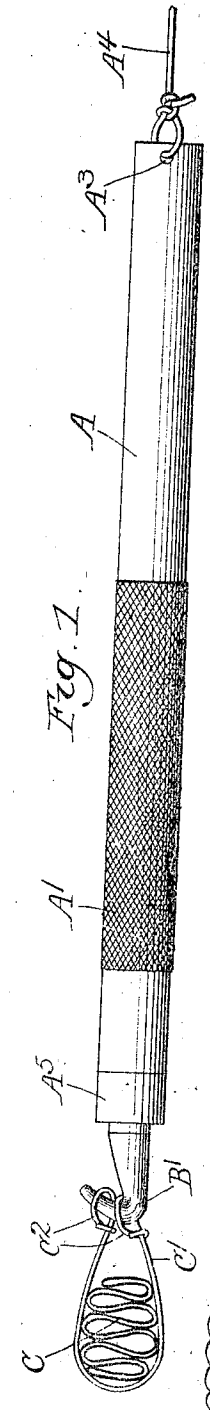


Fig. 1.

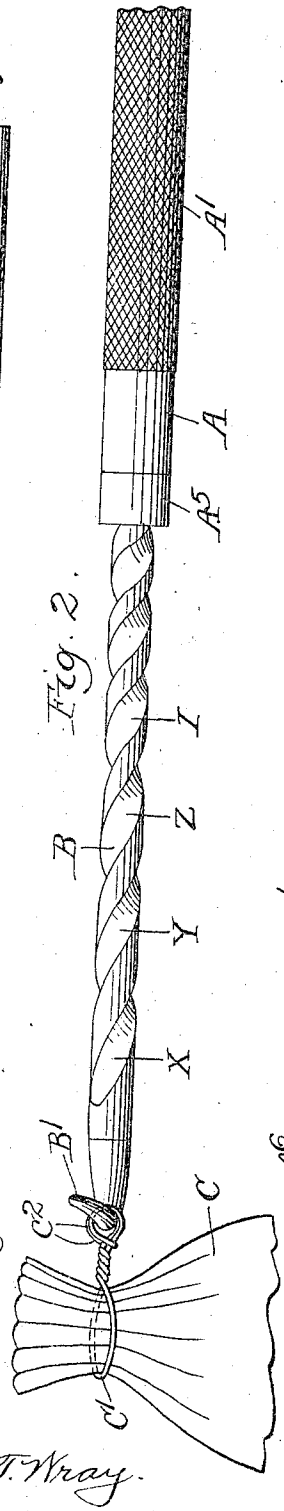


Fig. 2.

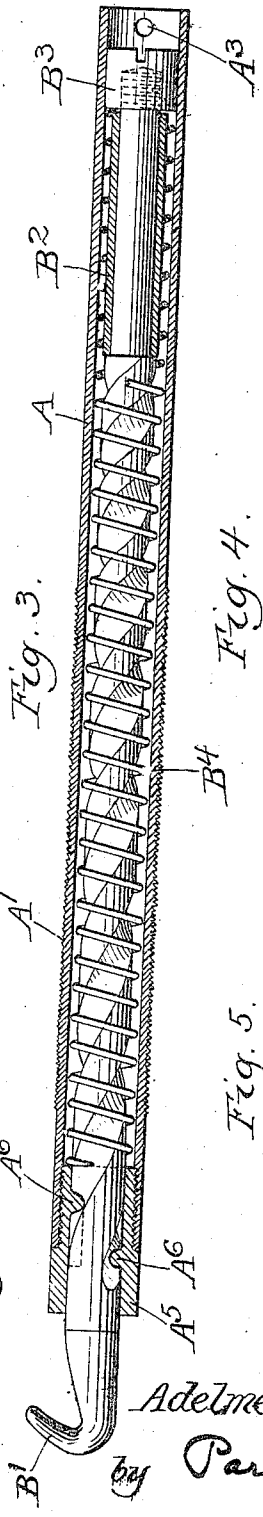


Fig. 3.

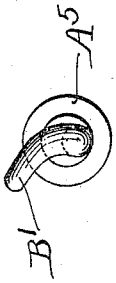


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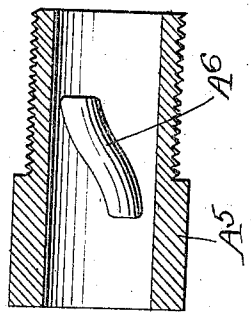


Fig. 5.

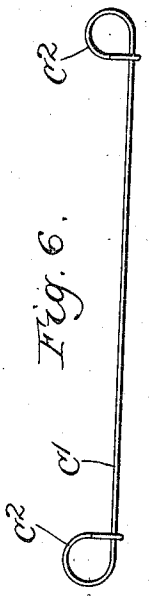


Fig. 6.

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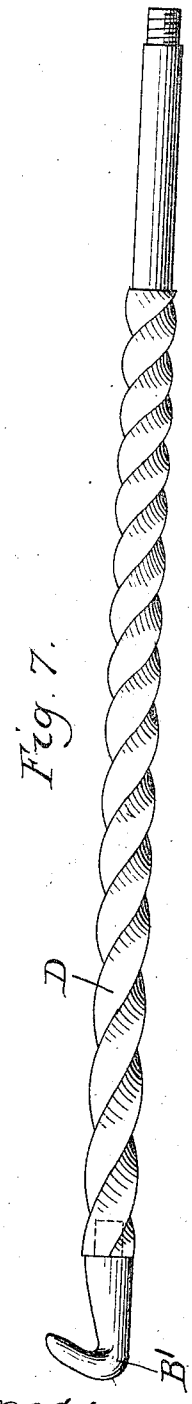


Fig. 7.



Fig. 9.



Fig. 8

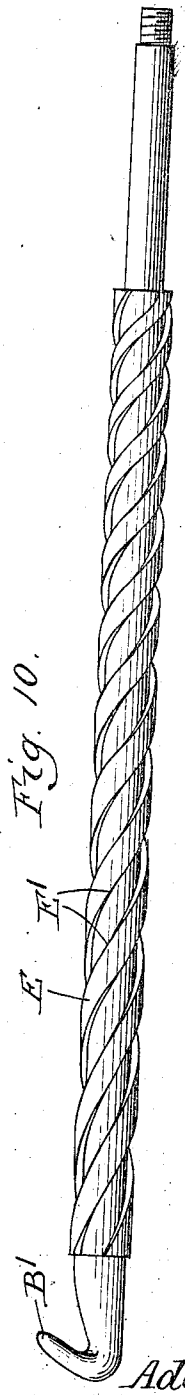


Fig. 10.

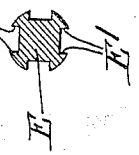


Fig. 11

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UNITED STATES PATENT OFFICE.

ADELMER M. BATES, OF CHICAGO, ILLINOIS, ASSIGNOR TO BATES VALVE BAG COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

WIRE-TYING TOOL.

Application filed September 27, 1920. Serial No. 413,047.

To all whom it may concern:

Be it known that I, ADELMER M. BATES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Wire-Tying Tools, of which the following is a specification.

My invention relates to wire tying tools by which the operator may, by the exertion of tension, twist a wire tie around the neck of a bag. One object of my invention is to provide a tool which is so arranged that as soon as the operator releases the tension, the hook which engages the loop on the end of the wire tie, automatically disengages therefrom. This is done by having the hook inclined in a plane inclined to the axis of rotation of the twisting element so that when the retracting spring draws the twisting element back into the handle, the rearward rotation will cause the hook to unscrew from the tie.

Another object of my invention is to provide a wire tying tool which will overcome the difficulty ordinarily found in starting the twisting of the tie. I accomplish this by having the spiral on the twisting shank cut on a varying pitch so that at the beginning of the movement, a relatively slow pull by the operator causes a comparatively slight, angular movement of the twisting shank owing to the spiral being cut on a gradual pitch. The nut at the head of the handle passes down to that part of the spiral where the twisting is more rapid and thus a greater rate of rotation is given, the idea being that before the two tie ends are crossed, it requires a considerable amount of power to start them and to start the twisting, and thus at the beginning of the movement, the slow pitch gives that power while at the end of the movement, the effective radius through which the apparatus twists is greater, hence the rapid twisting movement at the end of the stroke

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein;

Figure 1 is a side elevation of the wire tying tool before the tie has been made;

Figure 2 is a similar elevation after the tie has been made;

Figure 3 is a section on an enlarged scale showing the initial position;

Figure 4 is an end view showing the twisting of the hook;

Figure 5 is a section showing the spiral engaging lug;

Figure 6 is a view of the tie;

Figure 7 is a modified form of the spiral;

Figure 8 is a cross section of Figure 7 before twisting;

Figure 9 is a cross section after twisting;

Figure 10 is a side elevation of the modified form;

Figure 11 is a section thereof before it has been twisted.

Like parts are indicated by like characters throughout.

A is a twisting handle corrugated at A′ and having at its rear end a hole A^3 whereby a thong A^4 may be attached for holding. A^5 is a nut screw threaded into the front end of the hollow handle. This nut has a spiral engaging member A^6 on its inner surface.

B is the spiral. It is a rod which may be made as a spiral or screw threaded or it may be formed by twisting a flat rod which has at its outer end a hook B′. The spiral B is of varying pitch, that is it is more gradual and sharper toward the rear, the idea being that for a long movement from X to Y we get one revolution, from Y to Z a shorter distance we get one revolution and from Z to I we get one revolution. The result of this is that at the beginning of the turn before the ends of the tie are crossed, a relatively great long movement is required to give the twisting tension the desired power, afterward toward the end the twisting speeds up thus saving time.

B^2 is a sleeve surrounding the rear end of the spiral shank and is engaged and held in position by the nut B^3, which nut also holds the spiral spring B^4 and is so constructed between the nut B^3 at one end and the nut A^5 at the other so that the shank is pulled out into the hook so that the spring will be compressed between the two nuts.

C is the bag which is to be tied. C′ the bag tie having the looped ends C^2 adapted to be engaged by the hook B′ adapted as shown to move in the direction in which the hook is spiraled so that when the handle is pulled out from the position of Figure 1 it rotates in the direction of the hook, pulling the hook into the loops until the posi-

tion of Figure 2 is reached. When the tension on the handle is released the spring tends to pull the shank or spiral back and will rotate it in the opposite direction and unscrew the spirally disposed hook from the tie loops.

The modified form shown in Figure 7 the shank is made up of a square bar D and the square bar before being twisted is the cross section of Figure 8. It is twisted to provide the spiral as shown in Figure 7. When this is done the cross section becomes that of Figure 9 and it is only necessary to make the nut to fit that cross section. A disadvantage however of the spiral types of Figures 2 and 7 is that the spiral has curved walls and there is a tendency to wedge the parts and thereby increase friction and to require an undue amount of power for twisting them. To avoid this the modified form of Figure 10 is provided.

For Figure 10 is shown a spirally twisted slotted round rod, E. The slot has straight sides as indicated at E′ E′ and when twisted the cross section does not sensibly change, the result of this is that the drive is taken from the square sides E′ thus there is no tendency toward wedging action.

The use and operation of my invention are as follows:

The operator takes a bag tie in one hand, holding the tool in the other. He hooks one of the loops of the tie over the hook, passes the bight of the tie around the bag or other object which is to be fastened and brings the other eyelet back into engagement with the hook. This leaves the two ends of the tie somewhat widely separated. He then pulls on the tool and owing to the gradual pitch of the spiral, a relatively considerable linear movement of the hand piece with respect to the hook, will cause a comparatively slight rotary movement of the hook thus giving a high mechanical advantage at the beginning of the movement and overcoming the initial resistance to twisting. As the movement continues, the ends of the tie cross and from then on a comparatively lesser torque is required to twist the tie, and the pitch of the tool is therefore arranged so that the twisting hook rotates more rapidly as the tool is pulled back.

Owing to the inclination of the hook in the same direction as the twist of the spiral while twisting is going on, the hook tends to screw into the tie, thus making a secure hold, but as soon as the operator releases the tension, the spring which tends to pull the hook back into the handle commences its work and causes the spiral to twist back thus immediately disengaging the hook from the tie and making it unnecessary for the operator to manipulate the tool as has been necessary in the past to disengage the hook.

I claim:

1. In a wire tying tool a single axial tie engaging hook, means responsive to the exertion an axial tension thereupon for rotating it in one direction to twist the tie, and means automatically operative when the tension is released for rotating it in the opposite direction to disengage it from the tie.

2. In a wire tying tool adapted for use with a wire tie having a plurality of looped ends an axial hook adapted to engage said loops, means for rotating it in one direction to twist the tie, and means for automatically rotating it in the opposite direction to disengage it from the tie.

3. In a wire tying tool adapted for use with a wire tie having a plurality of looped ends of a hook adapted to engage said loops, means for rotating it in one direction to twist the tie, and means for automatically rotating it in the opposite direction to disengage it from the tie, said means operative only when the initial tension has been relaxed.

4. In a wire tying tool, a tie engaging hook located in a plane inclined to the axis of rotation, and means responsive to the exertion of a tension thereupon for rotating it in one direction to twist the tie, and means automatically operative when the tension is released for rotating it in the opposite direction to disengage it from the tie comprising a spring adapted to return the hook to its original position in relation to the handle.

5. In a wire tying tool a single axial tie engaging hook, and a handle associated therewith, means responsive to the longitudinal movement of the handle for rotating the hook in one direction to twist the tie, and means associated with the handle for thereafter rotating the hook in the opposite direction to disengage it from the tie, said means comprising a spring contained within the handle adapted to be compressed by the tie twisting movement.

6. In a wire tying tool a hook located in a plane inclined to the axis of rotation, a handle associated therewith, means responsive to the longitudinal movement of the handle for rotating the hook in one direction to twist the tie, and means associated with the handle for thereafter rotating the hook in the opposite direction to disengage it from the tie.

7. In a wire tying tool, a tie engaging element and means for rotating it to twist the tie in response to relative axial movement of the tool and the tie engaging element, and unit means for automatically disengaging it from the tie at the end of the operative twisting excursion and for returning it to its original position in relation to the handle.

8. In a wire tying tool, a tie engaging element and means for rotating it to twist the

tie in response to relative axial movement of the tool and the tie engaging element, and unit means for automatically disengaging it from the tie at the end of the operative twisting excursion and for returning it to its original position in relation to the handle, comprising a spiral spring substantially the same length when extended as the handle.

Signed at Chicago, county of Cook and State of Illinois, this 22nd day of September, 1920.

ADELMER M. BATES.