

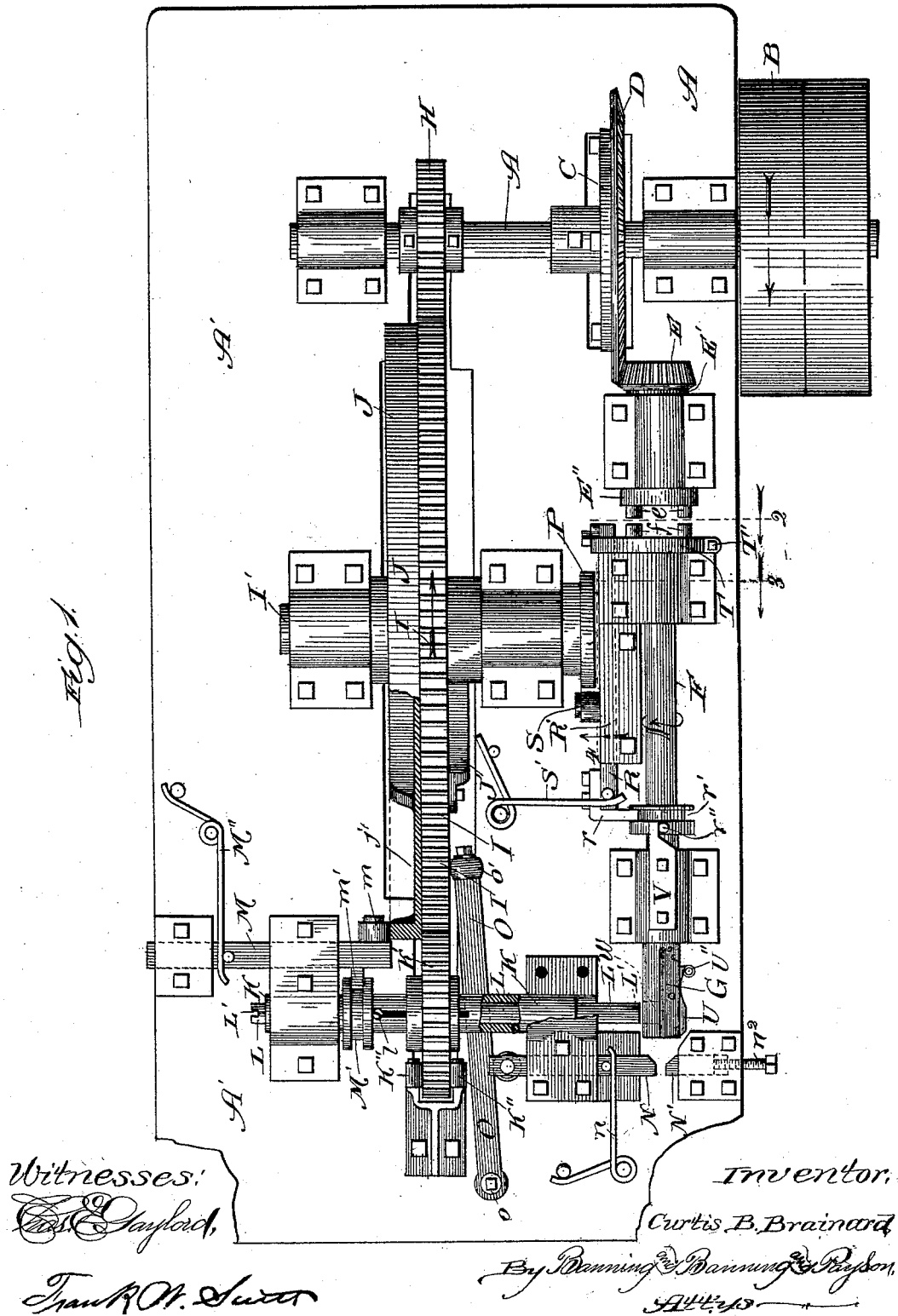
(No Model.)

2 Sheets—Sheet 1.

C. B. BRAINARD.
MACHINE FOR MAKING BALE TIES.

No. 419,917.

Patented Jan. 21, 1890.



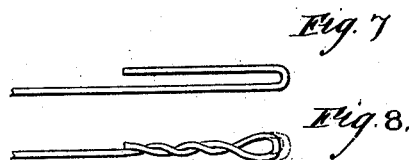
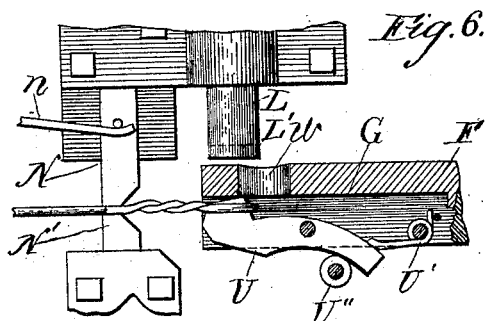
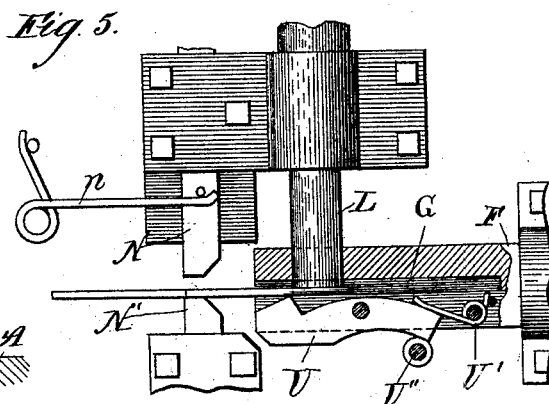
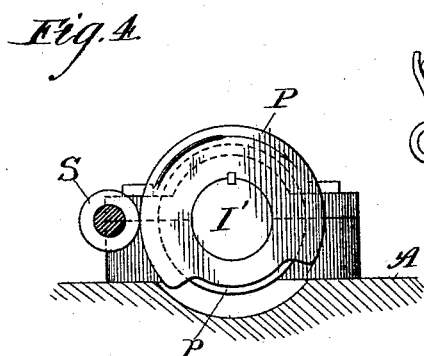
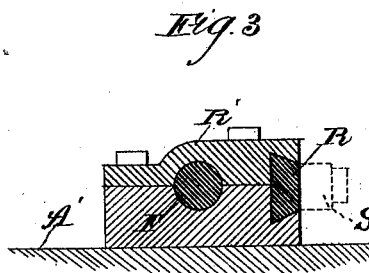
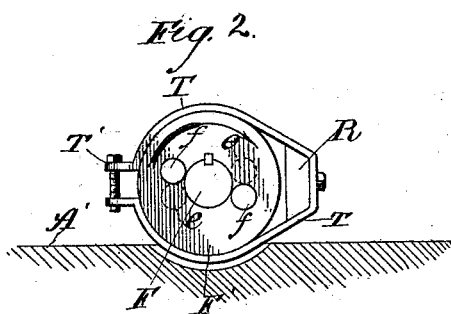
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MACHINE FOR MAKING BALE TIES.

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Patented Jan. 21, 1890.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING BALE-TIES.

SPECIFICATION forming part of Letters Patent No. 419,917, dated January 21, 1890.

Application filed September 2, 1889. Serial No. 322,683. (No model.)

To all whom it may concern:

Be it known that I, CURTIS B. BRAINARD, a citizen of the United States, residing at Joliet, Will county, Illinois, have invented a new and useful Improvement in Machines for Making Bale-Ties, of which the following is a specification.

As is well known, wire ties are used for fastening bales of hay after they have been compressed in the baling-press; and the object of my invention is to provide a machine which shall bend and twist the wire out of which the ties are to be made in order to form the requisite loops upon the ends thereof; and the invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a plan view of the entire machine; Fig. 2, an end view of a portion of the machine, taken on line 2 of Fig. 1; Fig. 3, a vertical section on line 3 of Fig. 1; Fig. 4, an end view, partly in section, on line 4 of Fig. 1; Fig. 5, a detail view of a portion of the machine, showing the wire bent; Fig. 6, a detail view of a portion of the machine, showing the wire bent and twisted; Fig. 7, a view of one end of the wire bent upon itself, thus partially forming the tie; and Fig. 8, a view of one end of the completed tie. All of the last seven figures are upon an enlarged scale, and in the case of sections or end views are taken in the direction indicated by the arrows in Fig. 1.

A is the main shaft; B, the driving-wheel; C, a plate attached by means of a collar and set-screw to the shaft A; D, a beveled gear-wheel mounted loosely on the shaft A and bolted to the plate C; E, a beveled gear meshing with D and carrying with it the shaft E'; to the end of which it is fastened; E'', a plate secured to the other end of the shaft E'; *e e*, pins or studs on such plate; F, a shaft with plate F' attached to one end thereof; *f f*, pins or studs on plate F', engaging with the pins *e e*; G, a slot or groove in the shaft F; H, a cog-wheel mounted on shaft A; I, a cog on shaft I', meshing with cog H; J, a cam-plate attached to the side of cog I; J', a cam attached to the other side of cog I; K, a hollow shaft; K', a cog thereon meshing with cog I; K'', rollers for preserving the

alignment of cog K'; L, a twisting-tool passing through the hollow shaft K and fastened by means of a set-screw *l*; L' L', slots in the ends of tool L; M, a bar carrying roller *m* and pin *m'*, the pin engaging with a collar M' on shaft K; M'', a spring for moving the bar M; N N', the jaws of a vise; *n*, a spring for moving the jaw N in one direction; O, a lever for moving jaw N in the opposite direction and engaging with cam J'; P, a cam attached to the end of shaft I'; R, a beveled plate or bar sliding in ways R' and carrying pin *r*, engaging with collar *r'* on shaft F; S, a roller on plate R engaging with cam P, and S' a spring for moving plate R.

In constructing my improved machine I first make the shaft A. This and all other shafts are to be mounted in suitable bearings on the bed-plate A', as shown in the drawings.

I next make of suitable dimensions the plate and collar C and key them to the shaft. On the shaft I loosely mount the hollow gear-wheel D and bolt it to the plate C, as shown. This plate is provided with slots concentric with its axis to allow of the adjustment of the gear D, the bolts by which the plate and gear are fastened together passing through the slots and being screwed into the back of the gear-wheel.

I then make the shaft E', having a beveled gear E attached to one end. This gear meshes with the gear D, and is preferably one-fourth its size, so that one revolution of the gear D will cause the gear E to revolve four times. In the other end of the shaft E', I attach a circular plate E'', having two or more pins *e e* projecting from its face.

The shaft F is then made and mounted in bearings in a line with shaft E'. To the end of this shaft, next to the plate E'' on the end of the shaft E', I attach a similar plate F', having projecting pins *f f*, adapted to engage with the pins *e e* when the plates are made to approach each other in the manner hereinafter set forth, whereby the motion of the shaft E' is communicated to the shaft F. At the other end of the latter shaft I make a groove or depression G of suitable length and diameter to receive the wire to be made into a tie.

For the present I pass by a description of

the collar r' , &c., to take them up again in the proper order, and go on to the other parts of the device.

To the shaft A is attached, by means of suitable set-screws, the cog-wheel H. This wheel meshes with a similar wheel I, mounted on a shaft I'. This latter wheel is preferably about two feet in diameter in a full-sized machine. To one side of this cog I fasten the cam-plate J. This consists of a circular plate of substantially equal diameter with the cog I, and has a raised edge j , which is cut away for a portion of the circumference, as indicated at j' in Fig. 1. The bar M carries a roller m at one end, which is pressed against the raised edge of the cam-plate J by means of the spring M''.

I next make the hollow shaft K, and loosely mounted on it the gear K', meshing with gear I. To keep this gear in alignment and prevent sidewise slipping, I prefer to provide the rollers K'', one on either side of the gear-wheel. The gear-wheel is fastened to the shaft K by means of a key, and the shaft is slotted, as shown, to allow it to slide back and forth on the key through the gear. To the shaft K, I also attach a collar M', and on the bar M, I provide a pin m' , which engages with this collar, so that when the bar M moves back and forth it carries the shaft K along with it. Through the hollow shaft I pass the twisting-tool L, having at either end a slot I' of a size adapted to embrace the wire of the tie. The slots at the ends are of different sizes, adapting the tool to different sizes of wire. The tool is secured in place by means of the set-screw.

Next I construct the vise or grip N. This consists of two jaws N N', the latter being stationary and adapted to be adjusted by means of a screw n'' . The jaw N moves back and forth in bearings, being moved in one direction by the spring n and in the other by the lever O. This lever is pivoted at one end at o , and at its other end carries, preferably, a friction-roller O', adapted to be engaged by the cam J'.

To the end of the shaft I' is attached a cam P. (Shown more particularly in Fig. 4.) A beveled bar or plate R is then made, sliding in ways R' and carrying a roller S, engaging with the cam P. This plate, bearing, and roller are set out in Fig. 3. To the end of this plate or bar R, I fasten the pin or hook r , which engages with a collar r' on the shaft F. At the other end of this shaft F is a strap T, adapted to be tightened by means of the screw T' and intended to act as a brake for the shaft to prevent it from revolving too freely. (See Fig. 2.) On the collar r' is a pin r'' , adapted to strike against a stop V on the journal-box of the shaft F.

At the grooved end of the shaft F, I make a movable tongue to aid in forming the loop in the ties. This consists of the pivoted tongue U, adapted to be forced by the spring U' into the loop of the wire in the manner herein-

after described. This device is shown in Fig. 5.

The machine is shown in Fig. 1 with all the parts in substantially the proper position to commence working, and, power being applied to the wheel B, the machine operates in the following manner: A piece of wire of requisite length is laid in the slot G. The wheel B is revolved toward the left, carrying with it the cog-wheels D and H. The latter, revolving to the left and meshing with the wheel I, turns this wheel toward the right. The cam-plate J, revolving with the wheel I, brings the opening j' opposite the roller m . This roller and the bar on which it is mounted are immediately forced into this opening by means of the spring M''. As the bar M moves toward the wheel I, it, by means of its connection with the hollow shaft K, moves the latter, together with the tool inside thereof. This tool (which is continuously rotated by means of the cog K meshing with the cog I) passes into the aperture W in the shaft F, (indicated by dotted lines,) and the groove or depression in the end of the tool catches hold of the wire lying in the slot, and, the tool continuing to rotate, the wire is bent back upon itself in the form shown in Fig. 7. The parts of the machine are to be so adjusted that as this tool enters into the aperture the slot I' shall be in a position to receive the wire. It will be evident that so long as the wheel m remains in the depression or opening j' so long the tool will twist the wire toward the right. I have therefore made this depression j' so long that by the time the tool has made a half a revolution to the right the roller m shall ascend the other side of the depression onto the raised edge J of the cam-plate. As the roller rises onto this edge it will be forced back, carrying with it the bar M and shaft K and withdrawing the tool L. If desired, the depression j' may be long enough to allow the tool to revolve three halves, five halves, &c., of a circumference.

I have already described the cam-wheel P, roller S, &c. Now, just as the roller m is forced back by the cam-plate J, the roller S is allowed by the revolution of the cam P to enter into the depression p thereof. The instant it does so the spring S' moves the bar R backward until the pins f engage with the pins e , as indicated in Fig. 2. As the shaft E' is rotated toward the right by means of the shaft A and gears D and E, as soon as the pins engage, the shaft F will be carried in the same direction, and the wire, being held in the manner hereinafter to be set forth, will be twisted into the form shown in Fig. 8, forming one end of the tie.

It is evident that the number of revolutions to be made by the shaft F will depend upon the length of the depression p in the cam P, and I prefer that this should be long enough to allow the shaft to revolve four times, and the machine illustrated is so made. When the shaft has revolved four times, the

roller S will be forced back by the cam P, and, carrying with it the shaft F, will disengage the pins *f f* and *e e*. The shaft F will cease to rotate when the pin *r''* strikes against the stop V, and will be left with the groove G in position to receive another wire.

To hold the wire firmly while being twisted, I have provided the vise N N', which operates in the following manner: Just at the instant the shaft F is forced back far enough for the pins to engage, but before it begins to rotate, the revolution of the cog-wheel I brings the cam J' into contact with the end of the lever O and forces the lever sidewise, carrying with it the movable jaw N, thus tightly clamping the wire. The cam is made concentric with the cog-wheel J and is long enough to hold the jaw N against the wire while the shaft F is revolving; but just as the shaft stops the cam J' ends, and the lever and jaw N are forced to return to their former position by means of the spring *n*. The other end of the piece of wire is then treated in the same way and the bale-tie is complete. This operation forms a substantially-circular loop, as shown by the solid lines in Fig. 8. If it be desired to form a longer or oval one, as indicated by the dotted lines in that figure, I use a tongue U. This is held normally out of the way by the fixed pin U''; but as the shaft F is carried back by the spring S' the spring U' forces the end of the tongue U through the bend of the wire, (shown in Fig. 7.) and when the wire is twisted the loop is formed around the end of the tongue, which may be of any desired length.

I have described above what I consider the best form in which to make my machine; but in many instances other devices might be used than those set forth without departing from the spirit of my invention. For instance, other means, as an ordinary clutch, might be employed to communicate the motion of the shaft E' to the shaft F. Different springs might be used and similar changes made as desired.

I claim—

1. The combination of the hollow shaft K, carrying the tool L, the apertured grooved shaft F, adapted to receive the wire, and means for moving the hollow shaft and tool back and forth and revolving them, whereby the wire is bent, substantially as described.

2. In a machine for making bale-ties, the grooved twisting-shaft F, to receive the wire, clutches F' and E'', means for bringing these clutches into engagement, and grips N N', for grasping the wire while the shaft is revolving, whereby the wire is twisted, substantially as described.

3. In a machine for making bale-ties, the combination of the hollow shaft K, carrying a bending-tool, the apertured grooved twisting-shaft F, and means, substantially as described, for moving such shafts back and forth and revolving them, whereby the wire

is first bent and then twisted to form the bale-tie.

4. In a machine for making bale-ties, the combination of gear-wheel I, cam-plate J, fastened thereto, means for revolving such wheel, bar M, engaging with the hollow shaft K, carrying a bending-tool and carrying roller *m*, and spring M'', whereby as the gear-wheel revolves the shaft K and bar M are moved in one direction by the spring and in the other by the cam-plate J, substantially as described.

5. In a machine for making bale-ties, the combination of the gear-wheel having cam J', means for revolving such wheel, grips N N', spring *n*, and lever-arm O, adapted to engage with the cam J', whereby as the gear-wheel revolves the grip N is first forced by the cam and lever O against the grip N', and then by the spring *n* away therefrom, substantially as described.

6. In a machine for making bale-ties, the combination of the shaft I', carrying cam P, means for revolving such shaft, sliding bar R, engaging with twisting-shaft F, roller S, fastened to the sliding bar and engaging with the cam, and spring S', whereby as the shaft I' revolves the bar and shaft F are carried in one direction by the cam and roller and in the other by the spring, substantially as described.

7. In a machine for making bale-ties, the combination of the shaft A, carrying gear-wheel D, shaft E', carrying gear-wheel E and pin-plate E'', and sliding twisting-shaft F, carrying pin-plate F', adapted to engage with pin-plate E'', substantially as described.

8. The combination of a main shaft carrying a beveled gear-wheel, a shaft E', carrying a beveled gear-wheel E, engaging with the first gear and a pin-plate E'', a sliding twisting-shaft F, having a pin-plate F', adapted to engage with the plate E'', and means for bringing the plates into engagement, whereby the motion of the shaft E' is communicated to the shaft F, substantially as described.

9. The combination of the shaft A, having gear-wheels D and H mounted thereon, shaft E', carrying gear-wheel E and clutch E'', sliding twisting-shaft F, carrying clutch F', adapted to engage with clutch E'', means for bringing the clutches into engagement, gear-wheel I, meshing with gear H and provided with cam J', grips N N', and lever O, adapted to be engaged by the cam J', whereby the grips are forced together, substantially as described.

10. The combination of shaft A, gears H, I, and K', cam-plate J, fastened to gear I, bar M, carrying roller *m* and pin *m'*, hollow shaft K, provided with collar M', twisting-tool L, and shaft F, having slot G, to receive the wire, and an aperture to allow the tool to enter and grasp the wire, substantially as described.

11. In a machine for making bale-ties, the combination of the hollow slotted shaft K, carrying a bending-tool, gear-wheel K', loosely

splined on such shaft, and rollers or guides K'' K'', for preserving the alignment of such gear, substantially as described.

12. In a machine for making bale-ties, the
5 combination of a twisting-shaft F, clutch F' E'', and a strap T, surrounding such clutch, substantially as described.

13. In a machine for making bale-ties, the
combination of the grooved twisting-shaft
10 carrying pin r'', means for revolving such shaft, and stop V, against which the pin

strikes, whereby the motion of the shaft is stopped just as the groove is in position to receive the wire, substantially as described.

14. In a machine for making bale-ties, the 15
combination of the twisting-shaft, means for revolving the same, and the tongue U, pivoted in such shaft, substantially as described.

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Witnesses:

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