(No Model.) 2 Sheets—Sheet 1.

J. L. WARE.

GRAIN BINDER.

No. 256,179. Patented Apr. 11, 1882.

Fig. 1.

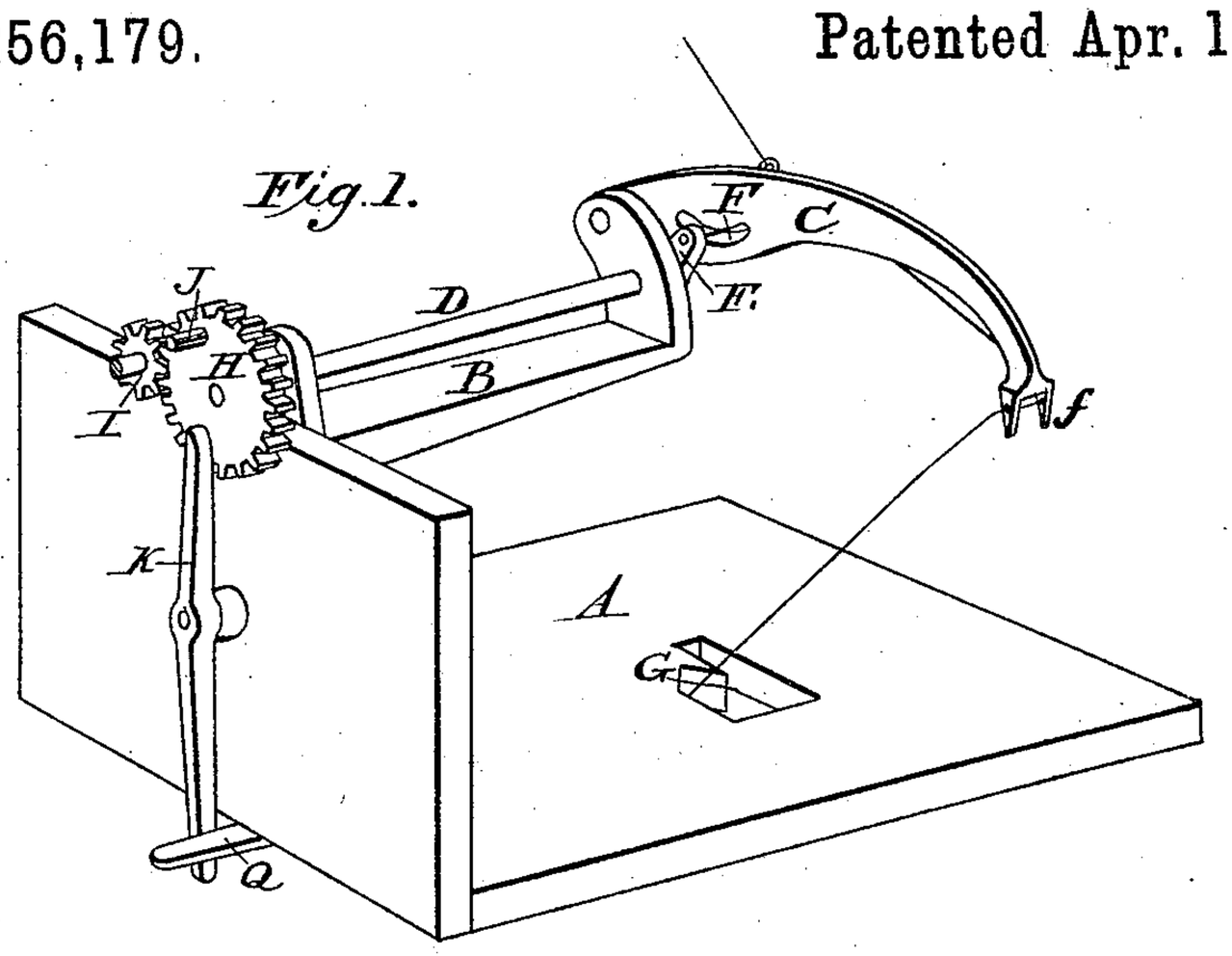
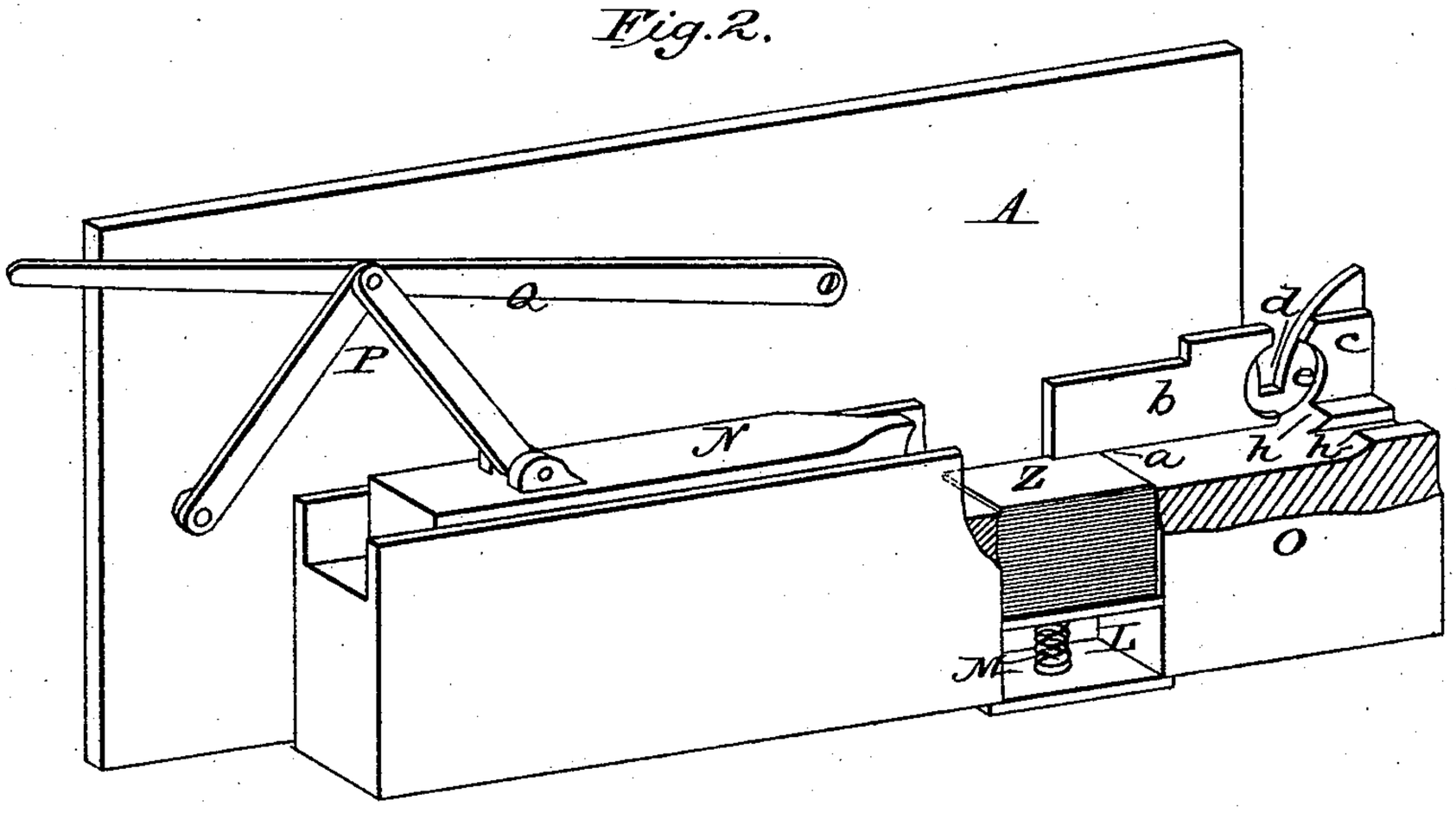


Fig. 2.



Witnesses.

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(No Model.) 2 Sheets—Sheet 2.

J. L. WARE.

GRAIN BINDER.

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Fig. 3.

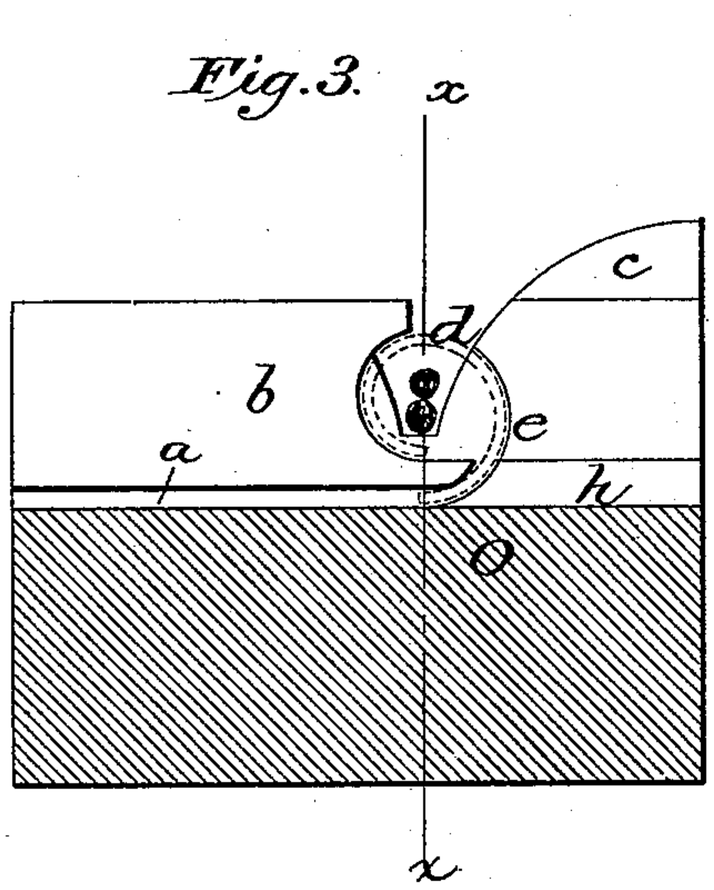


Fig. 4.

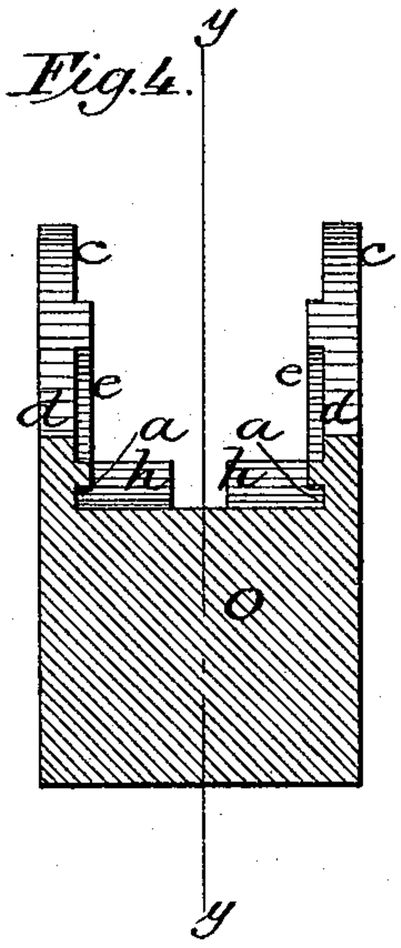


Fig. 5.

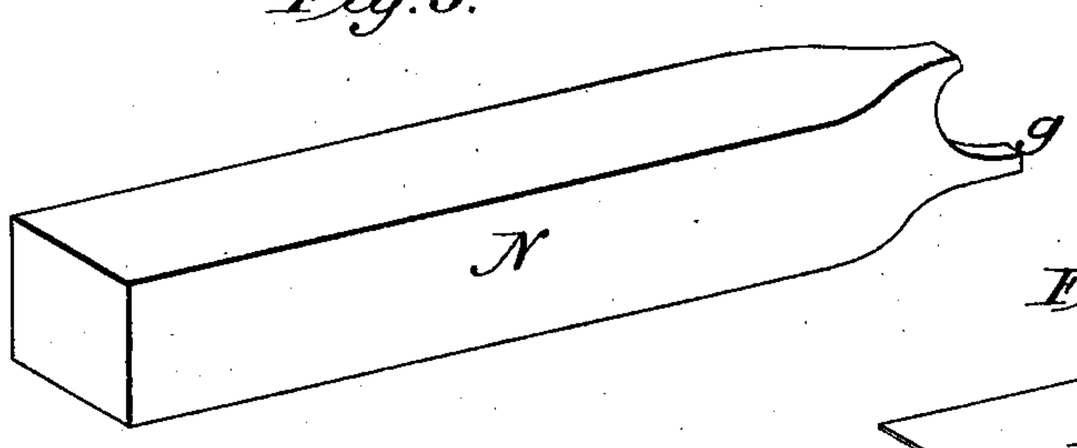


Fig. 6.

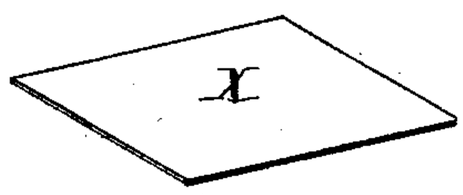


Fig. 7.

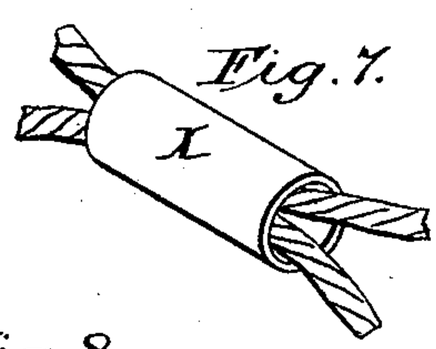


Fig. 8.

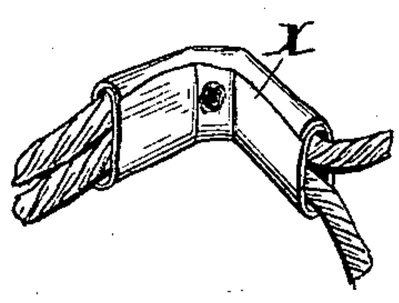
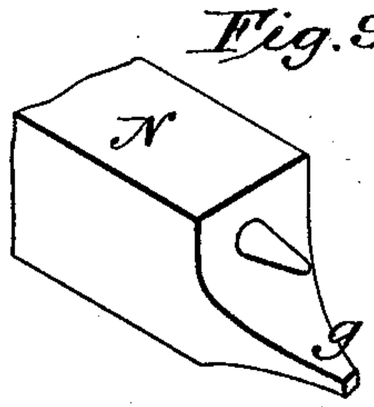


Fig. 9.



Witnesses.

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By P. T. Dodge.

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UNITED STATES PATENT OFFICE.

JOSEPH L. WARE, OF PINE ISLAND, MINNESOTA.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 256,179, dated April 11, 1882.

Application filed April 22, 1881. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH L. WARE, of Pine Island, in the county of Goodhue and State of Minnesota, have invented certain Improvements in Grain-Binders, of which the following is a specification.

My invention relates to an improved fastening for securing the ends of the cord-bands used for binding grain, and to a machine for forming and applying the said fastening device.

My fastening device consists of a small sheet of metal coiled around the ends of the band and secured by being flattened and bent, a perforation being also employed at the center, if desired.

My device for applying the bands consists essentially of an anvil or block provided with curved cheeks, means for applying the cord across the anvil, and means for forcing the fastening plate or wire against the curved shoulders of the anvil, whereby the shoulders are caused to bend or curl the metal around the ends of the band and sustain the metal while being flattened or perforated.

The invention also consists in various mechanical features of minor importance.

Referring to the drawings, Figure 1 represents a perspective view of one form of my binding-machine. Fig. 2 is a perspective view looking against the under side of the binding-table, and showing the devices by which the fastenings are applied, one side of the anvil being broken away to expose other parts. Fig. 3 is a longitudinal central section through the devices by which the fastenings are applied and secured; Fig. 4, a cross-section of the same on the line *x x;* Fig. 5, a perspective view of the sliding finger by which the metallic fastenings are carried against the anvil. Fig. 6 is a view of one of the metal plates or fastenings previous to its application. Fig. 7 is a perspective view, showing the fastening device coiled around the ends of the band previous to its being flattened down thereon; Fig. 8, a perspective view, showing the fastening device as it appears when complete; Fig. 9, a perspective view, showing a modified form of the sliding punch or finger.

In order that the operation of the machine may be the more readily understood, I will first describe my fastening device in its ordinary form of sheet metal.

Referring to Fig. 6, Z represents a flat rectangular sheet of tin, ordinarily of a size of about one-half to three-quarters of an inch in width by about one inch in length. This plate is converted into a fastening by coiling or bending it into a tubular form around the two ends of the applied band, as represented in Fig. 7, and subsequently flattening or crushing it down at the middle until it bears firmly upon the band and assumes a bent or angular form, as shown in Fig. 8. It will be noticed that the application of the pressure to the central portion of the fastening device has the effect of flattening to a limited extent that portion of the device immediately adjacent to that which is acted upon by the punch or flattening device. This incidental flattening of the device outside the line of the punch or tool is of no material effect. When thus formed and applied the device forms a very strong and secure fastening, from which it is impossible to withdraw the ends of the band by any ordinary strain, and which has no liability to cut or sever the band.

If desired, as an additional means of security, a hole may be punched into or through the middle portion of the fastening, as represented in Fig. 8. This hole will be formed by means of a punch or die, which will have the effect of forming a central neck or burr within the fastening to engage with the cord. The punching of this central hole also serves, like the flattening down of the device, to assist in preventing the fastening from being uncoiled. While it is not necessary to give the fastening device the bend or angular form, it is preferred to do so, because of the additional security attained.

Passing now to the machine by means of which the fastening device is applied, A represents the binding-table upon which the loose grain is received and bound; and B represents a horizontal arm overhanging said table and giving support to the binding-arm C, pivoted thereto, and also to a horizontal driving-shaft, D, which has one end provided with a crank, E, engaging in a curved slot, F, in the binder-arm. The rotation of the crank imparts to the binder-arm a vertical vibration, causing its end to first rise above the table and the grain

thereon, and then swing downward through an opening, G, in the table, for the purpose of carrying the band around the bundle and presenting the same to the fastening devices which are located beneath the table. The shaft D receives motion through a gear-wheel, H, on its end from a driving-pinion, I, which will be driven in any suitable manner from the gear of the harvesting-machine or otherwise. The wheel H is provided, as shown in Fig. 1, with a stud or pin, J, arranged to act at regular intervals upon an upright lever, K, by which the band-fastening devices are operated, as hereinafter explained. It will be observed that the slot F in the binder-arm C is of a curved form, the effect of which is to cause the binder-arm to remain at rest in its lowermost position with a sufficient length of time to permit the band-fastening devices to operate.

Referring now to Figs. 2, 3, and 4, L represents a vertical chamber or magazine in which the blank fastening devices Z are arranged above a spring, M, by which they are forced upward to a sliding punch, N, by which the blanks are removed from the top of the pile, one at a time, and carried forward to the anvil O, their edges being retained and guided during their advance in grooves *a* formed in cheek-pieces *b*. The anvil O consists mainly of two upright parallel cheek-pieces or side plates, *c*, provided on their outer edges with grooves *d* to receive and guide the ends of the cord, and in their inner edges or faces with curved shoulders *e* for the purpose of acting against the edges of the blank Z and curling the same around the ends of the band. The binder-arm has its end provided with a transversely-perforated nose, *f*, as shown in Fig. 1, through which the binding-cord is passed, and which serves upon the descent of the binder-arm to lay the end of the band or cord through and across the fastening device or anvil O within the slot *d*, as indicated by dotted lines in Figs. 3 and 4. The reciprocating slide N has its end made concave and extended on the lower side to form a lip, *g*, as clearly represented in Fig. 5. The slide being drawn backward, a blank, Z, is forced upward before it into the grooves *a*. The ends of the band being then laid into and across the device, as above stated, the advance of the slide or punch N drives the blank forward in the grooves *a*, beneath the ends of the cord, until the forward end of the blank encounters the shoulders *e*, whereupon the shoulders curl the blank upward and cause it to pass around or encircle the two ends of the cord. As the curling of the blank is completed at the instant it has assumed the form of a complete tube around the cord, the slide, continuing its forward motion, drives the middle portion of the tube forward, thereby flattening the same down at the middle upon the cord and causing the tube to assume a bent or angular form, as shown in Fig. 8.

For the purpose of assisting the cheeks *e* in giving the curled form to the blank, the anvil is provided at its lower side with two raised curved shoulders, *h*, as shown in Figs. 2, 3, and 4, a space being left between the shoulders for the passage of the end of the slide, which is reduced in width in order that it may act the more readily in compressing and bending the blank.

If desired, the punch or slide N may be provided with a punch, as shown in Fig. 9, to form a hole or indentation in the middle of the fastening device. The slide is also susceptible of other modifications in form—such, for instance, as the formation thereon of two lips or ribs to form separate indentations or compressions in the middle of the fastening device.

For the purpose of severing the band and holding the newly-formed end, I propose to make use of devices similar to those now used in other binding-machines, the construction and arrangement of these devices forming no part of the present invention.

As a means of operating the slide or punch, I make use in the present instance of toggle-levers P, connected with the slide, and with an operating-lever, Q, the latter being connected in turn with the lever operated by the pin on wheel H, as before described. After the formation and application of the fastening device by means of the slide are completed the slide is retracted, the binder-arm elevated, and the bundle discharged from the machine, the cord being of course severed previous to the discharge.

The essential feature of my fastening device consists in the means employed for encircling the end of the cord by the metal blanks, and, while it is preferred to retain the devices in the form shown in the drawings, they may be modified in form and arrangement to any extent desired, provided the general mode of action is retained.

The manner of operating the binder-arm and the slide are matters of minor importance, and may be departed from at will.

I am aware that a sheet-metal blank has been driven endwise against a stud recessed in one side, the effect of which was to double the blank in a U-form over the binding-cord, a punch and die being subsequently brought into operation to close the blank upon the cord and unite its edges. My arrangement differs therefrom in that my cheeks encircle the cord and serve by a single operation to coil the blank into the form of a tube completely encircling the band.

Having thus described my invention, what I claim is—

1. A grain-band fastening consisting of a sheet of metal coiled into a tubular form around the two ends of the band and compressed or flattened thereon at the middle only.

2. The band-fastening consisting of the coiled sheet metal compressed and bent at the middle, in the manner substantially as shown and described.

3. A grain-band fastening consisting of sheet metal coiled into tubular form around the ends

of the band and compressed thereon at the middle, and provided with a central indentation, as shown.

4. The sheet-metal band-fastening encircling the band and bent or curved longitudinally.

5. In a band-fastening mechanism, the combination of means for retaining the ends of the applied band in position and two curved cheeks constructed to encircle the ends of the band and engage with the two edges of a sheet-metal blank, substantially as shown, whereby the blank is caused to completely encircle the band.

6. In a grain-binding machine, circular cheeks adapted to substantially encircle the ends of the applied band, in combination with means for forcing a sheet-metal blank against and around the interior of said cheeks to the form of a complete tube.

7. In combination with the anvil having circular cheek-plates which substantially encircle the ends of the applied band, a reciprocating slide arranged to pass between said cheek-plates, substantially as described, whereby a sheet-metal blank may be coiled into a complete tubular form around the ends of the applied band.

8. The anvil provided with the curved cheeks *e* and notches *d*, in combination with a slide, N.

9. In a grain-binder, the combination of the circular cheeks, adapted and arranged to encircle the ends of the applied band, the magazine, and the slide, arranged to carry the blanks from the magazine and force them endwise around the interior of the cheeks, substantially as shown.

10. In combination with the anvil having curved cheeks *e*, the slide N, having the concave end and the extended lip or nose at the lower side.

11. In a grain-binder, the combination of two circular cheeks, arranged to encircle the ends of the applied band and engage with the edges of a sheet-metal blank, and a reciprocating carrier, arranged to force the blank endwise within the cheeks and continue its movement until the tube thus formed is bent and driven from between the cheeks.

12. In a grain-binding machine, the combination of an anvil having two curved cheeks to curl a metal blank around a grain band and the forked perforated binder-arm, substantially as described, adapted to compressing and holding the end of the band in position during the time that the band is being curled around the cord.

13. In a grain-binder, an anvil for carrying sheet-metal blanks around the applied band, provided with two curved cheek-plates adapted to engage with the extreme edges of the band.

JOSEPH L. WARE.

Witnesses:
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A. L. FLEMING.