(No Model.) 2 Sheets—Sheet 1.

E. P. BURNS.

MACHINE FOR FORMING SPRING TEETH.

No. 311,954. Patented Feb. 10, 1885.

Fig. 1

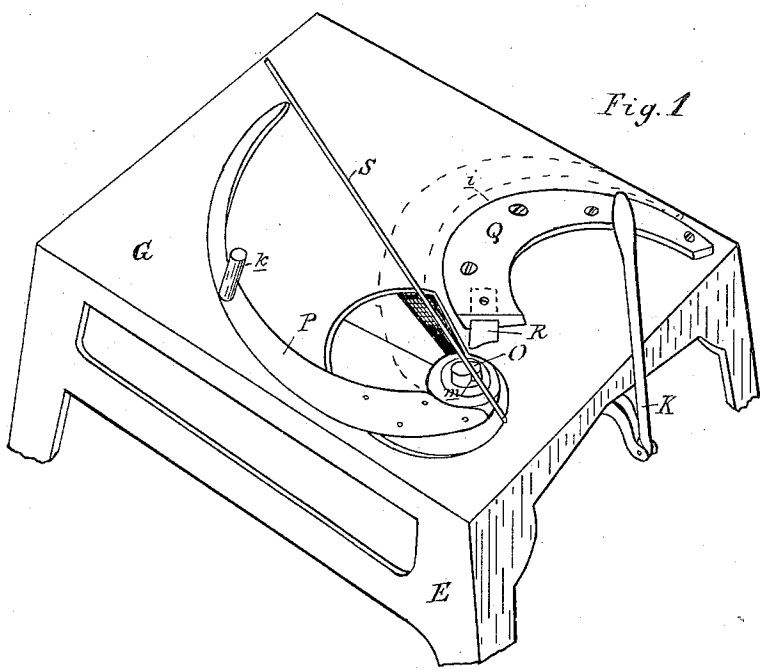
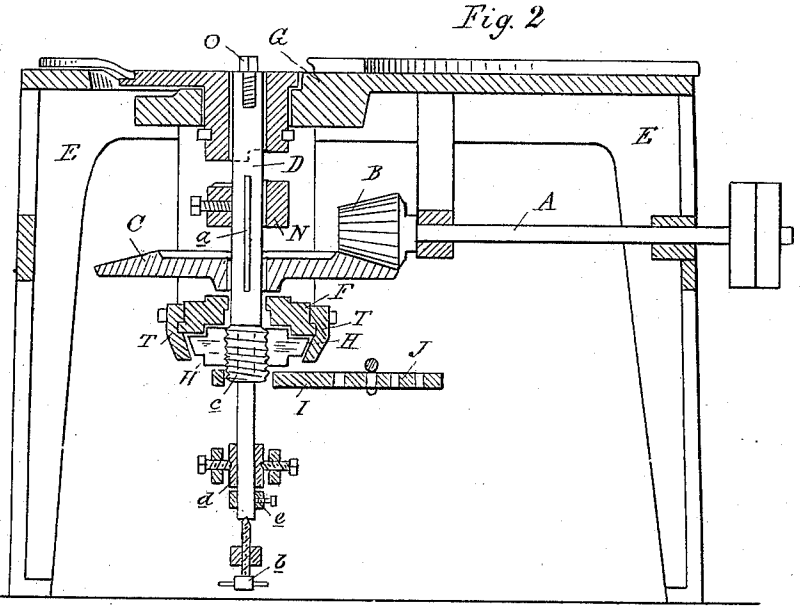


Fig. 2



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Elijah P. Burns
By his Atty Thos. J. Sprague

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.)

2 Sheets—Sheet 2.

E. P. BURNS.

MACHINE FOR FORMING SPRING TEETH.

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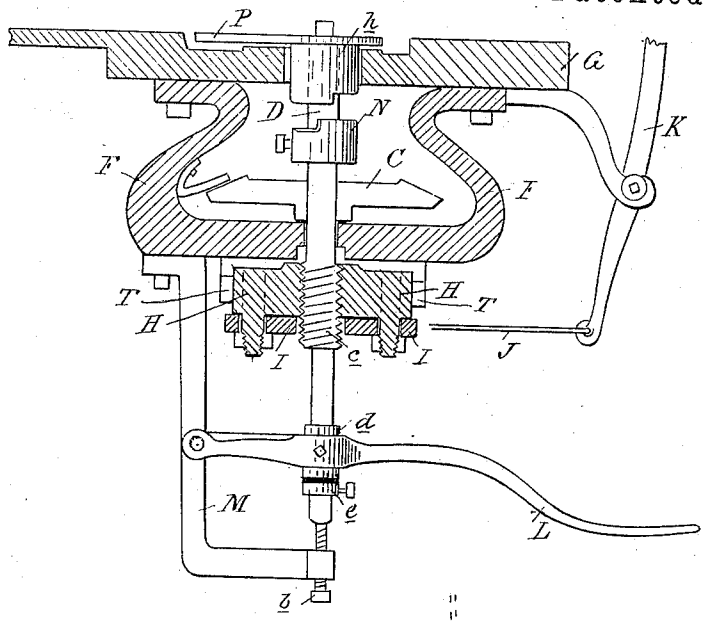


Fig. 3

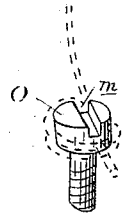


Fig. 8

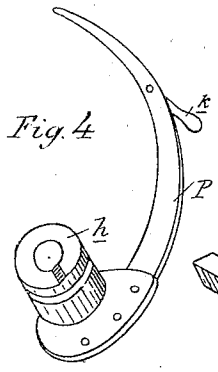


Fig. 4

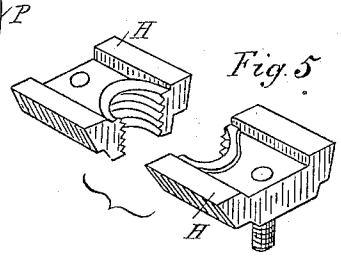


Fig. 5

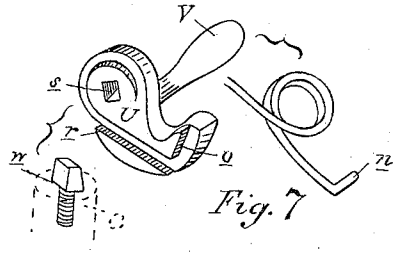


Fig. 7

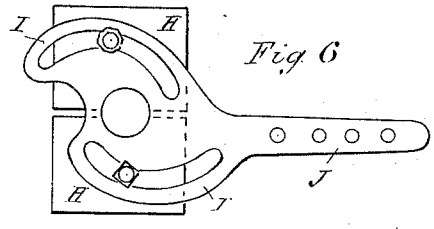


Fig. 6

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N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

ELIJAH P. BURNS, OF DETROIT, MICHIGAN, ASSIGNOR TO THE DETROIT STEEL AND SPRING WORKS, OF SAME PLACE.

MACHINE FOR FORMING SPRING-TEETH.

SPECIFICATION forming part of Letters Patent No. 311,954, dated February 10, 1885.

Application filed February 2, 1884. (No model.)

To all whom it may concern:

Be it known that I, ELIJAH P. BURNS, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Machines for Forming Spring-Teeth; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

The nature of this invention relates to certain new and useful improvements in the construction and operation of machines for forming the spring-teeth of horse hay-rakes; and the invention consists in the peculiar construction of the various parts, their combination, and operation, as more fully hereinafter described.

In the accompanying drawings, which form a part of this specification, Figure 1 is a perspective view of the top of the machine. Fig. 2 is a central longitudinal section. Fig. 3 is a vertical central cross-section. Fig. 4 is a detached perspective view of the bending-arm. Fig. 5 is a detached perspective of the screw-jaws. Fig. 6 is a bottom plan of the jaws, cams, and actuating-lever. Fig. 7 is a detached perspective view of the dies for forming the coil on a spring provided with an ear. Fig. 8 is a detached perspective view of a coiler such as is employed in forming the coil of a plain spring.

A represents the main driving-shaft, carrying on its inner end the bevel-pinion B, such shaft being suitably supported and connected with any suitable source of power. This pinion engages with the bevel spur-wheel C, which is secured on the vertical shaft D by means of a slot, *a*, in the shaft, and an engaging-feather (not shown) in the hub of the wheel, so that the wheel may rotate the shaft and at the same time have a vertical movement thereon. This shaft is stepped at the bottom on a set-screw, *b*.

E is a frame adapted to support the operating parts.

F is a hanger or frame, supported from the top G of the main frame.

H is a two-part nut, each part having a stud passing through and operated by a cam-groove, I, there being two of these grooves—one for each half of the centrally-divided nut—both formed in one plate attached to an actuating-lever, J.

K is a lever connecting with the lever J, so that the operator can readily actuate the same as circumstances may require. The shaft D is threaded to engage with this two part nut, as shown at *c*.

L is a treadle one end of which is pivotally secured to the step-arm M, supported from the frame F. This treadle is so constructed as to embrace a spool, *d*, mounted on the shaft D; and *e* is an adjustable collar on said shaft.

N is the half of a clutch, of ordinary construction, secured to the shaft D. The upper end of the shaft D is interiorly threaded to engage with a thread cut on the lower or bolt end of the coil-former or mandrel O.

P is a bending-finger provided with a hub, *h*, the lower end, *h'*, of which forms the upper half of a clutch designed to engage with the half-clutch N. This hub, carrying the finger, is mounted upon the upper end of the shaft D.

Q is a resistance-plate secured to the top G of the table, the form of the face *i* of which is the same as the curve of the bending-finger P.

R is an adjustable resistance-plate, secured in the end of the plate Q.

In practice the rod S, of which these springs are formed, having been cut to proper length, is heated in a suitable furnace and withdrawn therefrom, and the bending-finger P, being drawn back in the position shown in Fig. 1 by means of the handle *k*, the rod is laid into the cut M in the top of the mandrel O. The main shaft now being set in motion winds the rod around the head of the mandrel to form a coil, and as this coil is made by two wraps around the die, to prevent one overlapping the other and to form a close coil by means of the lever K and its connections, the two halves of the nut H are engaged with the thread on the shaft D, whereby the shaft is raised until the half N of the clutch engages with the other half of the clutch on the hub *h*, when the bending-finger moves forward, bending the projecting end of

the rod S into shape between the finger and its resistance-plate, the resistance-plate R holding the rod against the mandrel O, to form a compact and even coil in the rod. The two halves of the nut H reciprocate in the guides T, which are secured to the bottom of the frame F.

When the spring has been formed, as above described, the handle K is employed to withdraw the bending-finger P. The half-nuts are disengaged by projecting the lever K, and the operator with his foot depresses the lever L, which retracts the shaft D, thereby withdrawing the mandrel O from the coil of the spring, which is then removed for tempering.

In Fig. 7 a section of spring is shown with the coil, and an ear, *n*, on the short end of the rod. This ear is bent at right angles to the main body of the rod before the same is subjected to the action of the machine. In this case this ear and adjacent portion of the rod are laid in the channel *r* and against the shoulder *o* in the former U, which is provided with a socket, *s*, which engages with the head of the set-screw *w*, which in this case is screwed into the upper end of the shaft D in place of the mandrel O, hereinbefore described, and by the rotation of the shaft the coil is formed around the hub of the former U, which is provided with the handle V to enable the operator the more readily to use it.

What I claim as my invention is—

1. In a machine for forming spring-teeth, the combination of a mandrel secured in the upper end of a vertical shaft for forming the coil, a bending-finger sleeved upon said shaft, a clutch, and the means, substantially as described, constructed to bring said clutch into action in the rotation of said shaft, substantially as and for the purposes described.

2. In a machine for bending spring-teeth, the shaft D, finger P, and its hub *h*, in combination with the clutch N *h'*, the two-part nut H, cam-plate provided with the grooves I and actuating-lever J, whereby in the rotation of said shaft an engagement between the two parts N and *h'* of the clutch is compelled, substantially as specified.

3. In a machine for the purposes described, and in combination with the shaft D, two-part nut H, and devices, substantially as described, for operating the same, the guides T, secured to the frame F and embracing the nut, substantially as and for the purposes set forth.

4. In a machine for the purposes described, the combination of the wheel C, shaft D, two-part nut H, cam-plate provided with the grooves I, frame F, guides T, and treadle L, the parts being constructed, combined, and operating substantially as and for the purposes set forth.

5. In a machine for the purpose set forth, the combination of the shaft D and means for driving the same, with the resistance-plate Q, the bending-finger P, and the mechanism, substantially as described, for intermittently operating said finger, substantially as and for the purpose described.

6. In a machine for the purposes set forth, the combination of the shaft D and means for driving the same, with the mandrel O, bending-finger P, resistance-plate Q, and resistance-plate R, adjustable independently of the said resistance-plate Q, substantially as and for the purposes set forth.

ELIJAH P. BURNS.

Witnesses:
H. S. SPRAGUE,
E. SCULLY.