

No. 756,532.

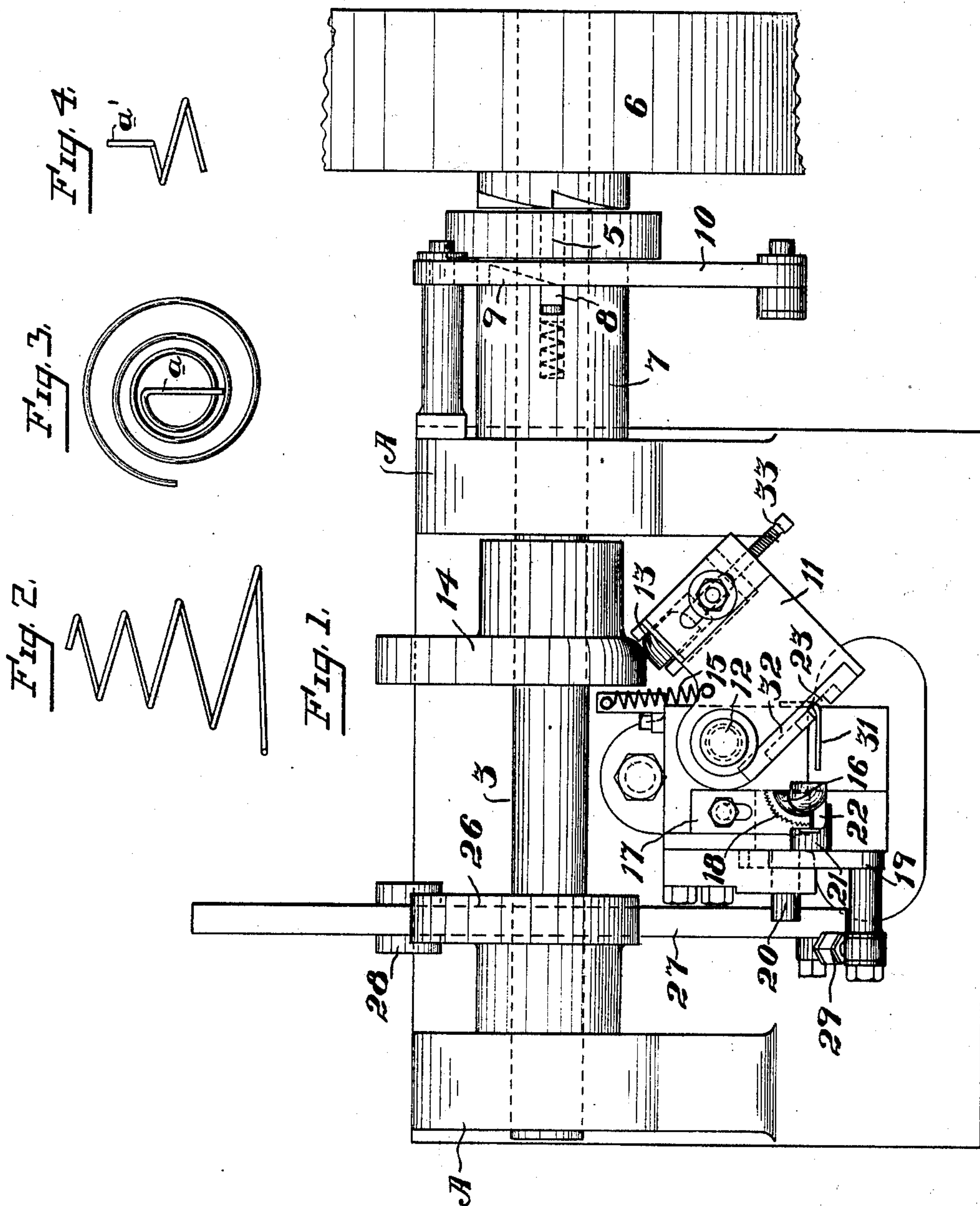
PATENTED APR. 5, 1904.

J. H. ROSS.
SPRING DOWEL FORMING MACHINE.

APPLICATION FILED SEPT. 25, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses,

J. H. Ross
Dudley Moss.

John H. Ross Inventor,
By Geo. H. Strong. Atty

No. 756,532.

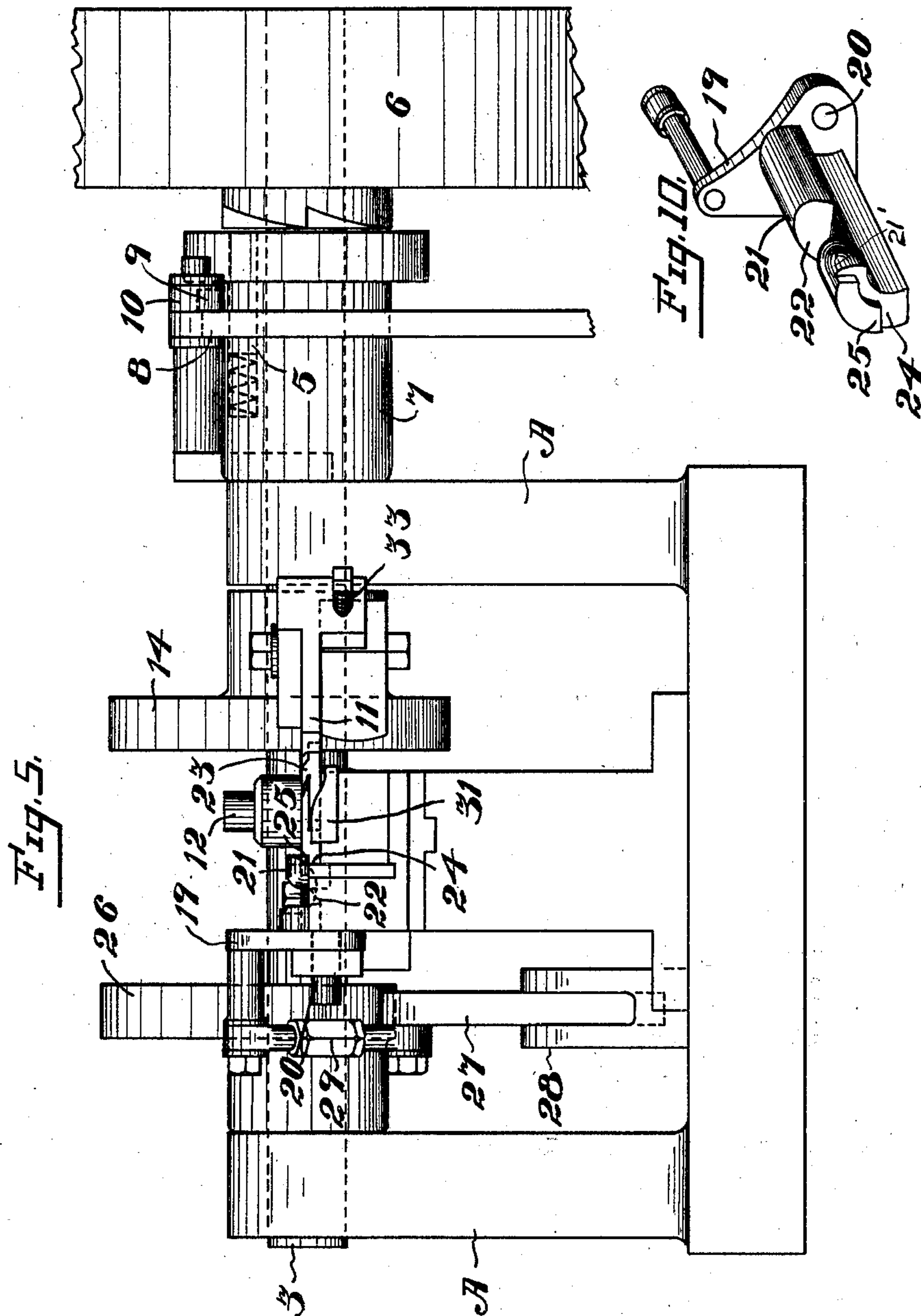
PATENTED APR. 5, 1904.

J. H. ROSS.
SPRING DOWEL FORMING MACHINE.

APPLICATION FILED SEPT. 25, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses,

*James
Dudley Wood.*

Inventor,
John H. Ross
Geo. H. Strong

No. 756,532.

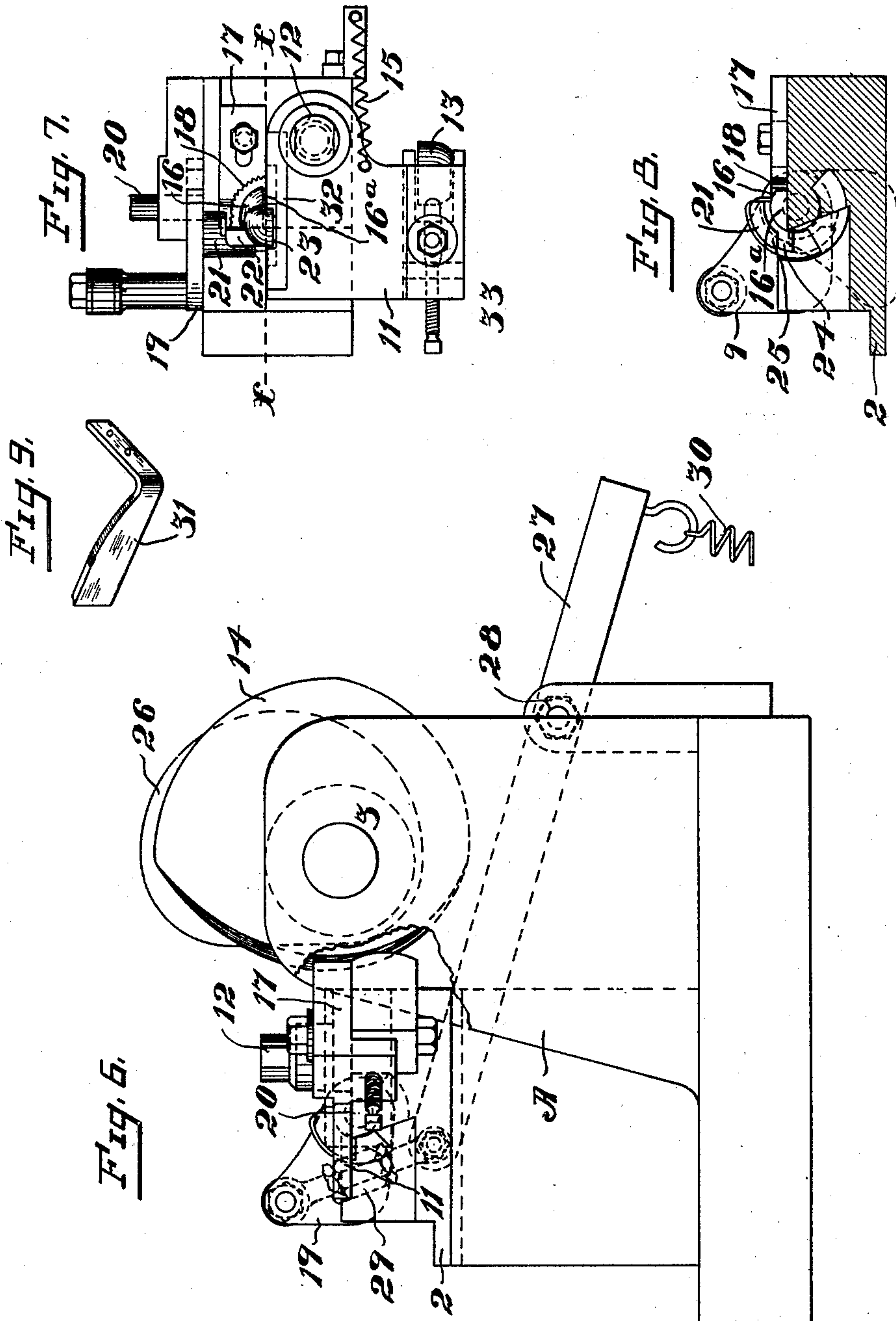
PATENTED APR. 5, 1904.

J. H. ROSS.
SPRING DOWEL FORMING MACHINE.

APPLICATION FILED SEPT. 25, 1903.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses,
John H. Ross
Charles H. Strong

Inventor,
John H. Ross
Charles H. Strong

UNITED STATES PATENT OFFICE.

JOHN H. ROSS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO AMERICAN STEEL & WIRE COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION.

SPRING-DOWEL-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 756,532, dated April 5, 1904.

Application filed September 25, 1903. Serial No. 174,602. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ROSS, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Spring-Dowel-Forming Machines, of which the following is a specification.

My invention relates to improvements in machines for forming dowels on coil furniture-springs.

It consists of the parts and the construction and combination of parts as hereinafter more fully described, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of my machine. Fig. 2 is a view of spring as it comes from coiler. Fig. 3 is a plan of same after first operation of machine. Fig. 4 is a partial side view of same after last operation. Fig. 5 is a front elevation of my machine. Fig. 6 is an end view of same. Fig. 7 is a plan of forming parts. Fig. 8 is a section on line *xx*, Fig. 7. Fig. 9 is a perspective of stop-spring. Fig. 10 is a perspective of vertical former.

After a spring comes from the coiling-machine in the shape shown in Fig. 2 it is necessary to bend the end of the wire at the smaller end of the spring outward substantially coincident with the axis of the coil to form the dowel and to wrap the opposite end of the wire about the adjacent fold of the coil. The latter operation is known as "knotting" the spring.

The object of the present invention is to provide a machine for making the dowels rapidly and of uniform length without danger of breaking the spring.

A represents the frame of my machine, 2 the bed-plate, and 3 the operating-shaft journaled in the frame and rotatable intermittently through the engagement of the spring-catch 5 with the clutch on the band-pulley 6, which is loose on the shaft. Spring-latch 5 is reciprocable longitudinally of the shaft in suitable guides in a collar 7, which is keyed to the shaft. The latch has a projection 8 extending outward to engage a notch 9 with a cam-surface on a lever 10 to hold the latch in normally retracted position. By a foot-

lever (not here shown) lever 10 is lifted to disengage the latch and allow the latter to press forward into the path of the clutch on pulley 6, causing the shaft to revolve. On releasing the foot-lever lever 10 drops, and when the latch comes around projection 8 engages notch 9, retracts the latch, and the shaft stops.

11 is a horizontal former-plate pivoted on the bed-plate at 12 and carrying an adjustable roller 13 in engagement with a cam or eccentric 14 on shaft 3. The contact of roller 13 with eccentric 14 is maintained by spring 15. The bed-plate has an upwardly-projecting lug 16 disposed adjacent to the outer limit of travel of the horizontal former-plate and carries an adjustable guide 17 relative to lug 16 and the former 11. This guide has a corrugated concaved face 18 conformable in curvature substantially to the adjacent wall of lug 16 and to the arc of the section of spring to be received between the guide and lug. The guide is adjustable to accommodate wire of different sizes.

The wall 16^a of lug 16 adjacent to former 11 is vertical, and when the former-plate is swung outward on the longest radius of eccentric 14 the edge of the former 11 and the said adjacent vertical wall 16^a of the lug will be substantially parallel and separated a distance equal to the thickness of the wire spring to be operated on.

The curved face 18 of guide 17 and the wall 16^a (see Fig. 7) inclose an acute angle corresponding substantially to that formed by the intersection of a radius and its arc and the length of the wall 16^a, corresponding to the radius of the loop at the smaller end of the conical spring, since in forming the dowel the wire-spring end must be bent first horizontally to intersect the axis of the spring and then bent outward substantially in the line of the axis.

When the loop at the small end of a spring is inserted between the guide and lug and against the edge of the horizontal former with the end of the spring bearing against spring-guide 31 and the former-plate 11 turned on its pivot, the several parts will cooperate to bend the end of the wire transverse to the axis

of the spring, as shown at *a* in Fig. 3. This is the first step in forming the dowel. The second and final step is to bend the straightened horizontal portion outward at right angles upon itself, as shown at *a'* in Fig. 4. This is done by the vertical former, which comprises an arm 19, pivoted at 20 to move in a vertical plane and having a lateral projection 21 notched, as at 22, coincidentally with the space between guide 17 and lug 16. The portion 21' of the projection 21 intermediate of its end and notch 22 constitutes the vertical former proper and is adapted to bend the straightened portion *a* of the spring downward when the latter is clamped between the lug 16 and the horizontal former. To this end the projection 21 moves in an arc which is substantially tangential to the front edge of the lug 16 and has a portion extending a trifle more than the thickness of the spring wire beyond the vertical wall 16^a, the working face of the horizontal former being notched, as at 23, to accommodate this projecting end. The under side of the projecting end of the former portion is cut away, as at 24, to accommodate the portion *a* of the wire when the latter has been bent into the first position. By pressing down on arm 19 the end of the wire which projects beyond the edge of the bed-plate and beneath the overhanging wall 25 of notch 24 is bent over the edge of the bed-plate, the arc of movement of the vertical former being such that the engaging wall 25 of notch 24 changes from its normal horizontal position parallel with and above the surface of the bed-plate to a vertical position parallel with and below the outer edge of said plate, as indicated in dotted lines, Fig. 8. The depression of the arm 19 is effected by means of a cam or eccentric 26 on shaft 3 and a lever 27, here shown as of the third class, pivoted beneath the cam, as at 28, and connected to the arm by an adjustable link 29. A spring 30 presses the link end of the lever upward, which is its normal position, so as to bring the vertical former into position relative to the surface of the bed-plate, the lug, and the horizontal former to admit the wire beneath the overhang 25.

The location of eccentric 26 on shaft 3 is such that its engagement with lever 27 will be subsequent in point of time to the engagement of eccentric 14 with roller 13 and the outward oscillation of the horizontal former. The engaging surfaces of the two eccentrics are relatively different, inasmuch as eccentric 14 must not only move the horizontal former to straighten and clamp the wire prior to the downward movement of the vertical former, but the wire must not be released until the vertical former has completed its downward movement.

In operation a wire spring such as comes direct from the coiling-machine is placed by the operator with the small end down between

the guide 17, lug 16, and the horizontal former, and the end of the spring bearing against the spring-guide 31. The latter is secured to the bed-plate and normally projects above the front edge of the bed-plate, so that as the horizontal former swings toward the lug the outward movement of the end of the wire will be limited. Without this guide the length of dowels of successive springs would vary continually. With it the length of the horizontal portion *a* of the spring may always be made uniform. The operator then raises on lever 10 to release clutch member 5, causing shaft 3, carrying cams 14 and 26, to make one complete revolution, the operator releasing the pressure on the foot-lever which controls lever 10 as soon as the shaft starts to turn. The stopping of the shaft is automatic through the engagement of projection 8 with notch 9. In the revolution of the shaft cam 14 first engages roller 13 to carry the horizontal former around toward lug 16, bend the end of the wire and clamp it, while cam 26 by a brief engagement with lever 27 operates the vertical former to bend the end of the wire projecting over the edge of the bed-plate downward to form the dowel, as shown in Fig. 4. The two formers on being released by their cams return to their normal position, the shaft stops, allowing the operator to remove the doweled spring, insert a fresh one, release the clutch, and so continue the operation. The horizontal former has a renewable working plate 32, and the arc of movement of the former may be varied by an adjustment of roller 13, as indicated at 33.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a spring-dowel-forming machine, the combination of spring-supporting means including a fixed part and an adjustment part having a curved working surface conformable to the arc of the spring-section to be engaged, means for bending the end of the spring-wire substantially at right angles to the axis of the spring, means for bending the portion so bent at right angles upon itself, and means for giving said several bending means a coördinate movement.

2. In a machine for forming dowels on coil furniture-springs and the like, the combination of segmental spring-holding members, one of said members having a surface corresponding to the radius substantially of said segment, means coöperating with said surface for bending the spring end substantially at right angles to the axis of the spring, and means having a coördinate movement with said bending means for again bending the spring end outward parallel with the axis of the spring, said bending means including a pivoted part 21 having a projection 25 substantially as described.

3. In a machine of the class described, the

combination of spring-supporting members, a horizontally-movable former member cooperating with said supporting members to bend and clamp the spring, and a vertically-movable former member, and means for giving the latter member a movement coördinate with the horizontal former, said means including an intermittently rotatable shaft and connections between said shaft and the several formers.

4. In a machine of the class described, the combination of a bed-plate or equivalent support, a projection on said support having a convex edge and a straight edge, a guide cooperating with said convex edge to hold the spring, a former member cooperating with the straight edge to bend and clamp the spring, and a former operating at right angles to the plane of the bed-plate, and means for operating said formers.

5. In a machine of the class described, the combination of a rigid part having a straight edge and a convexed surface conformable to the arc of the spring end to be bent, a part adjustable relative to said convexed surface and coacting therewith to hold the spring, a horizontally-movable member, a member movable at right angles to the plane of said horizontal member, and means for giving said members a coördinate movement.

6. In a machine of the class described, the combination of a support, an intermittently-rotatable shaft, horizontal and vertical former members operatable by said shaft, and means for supporting a coil-spring relative to said formers.

7. In a machine of the class described, the combination of coil-spring-holding means, a horizontal former, a vertical former, an intermittently-rotatable shaft, cams on said shaft, and means engaged by said cams for giving said formers a coördinate movement.

8. In a machine of the class described, the combination of a support, a shaft journaled therein, a former member oscillating in a horizontal plane, a second former member oscillating in a vertical plane, a coil-spring support relative to said former member, and means operatable by the shaft engaging said former members to give them a coördinate movement.

9. In a machine of the class described, the combination of a bed-plate or like support, an

oscillating horizontal former member having a removable face-plate, means for varying the oscillation of said former, an oscillating vertical former member, spring-holding means on the bed-plate relative to said former members, and a guide or stop engaging the end of the spring to regulate the length of the dowel.

10. In a machine of the class described, the combination with coil-spring-supporting means including a part having a convex surface and a surface substantially at right angles to said convex surface, of means whereby a section of the spring is bent substantially at right angles to the axis of the spring, and an oscillating former member engaging the said bent portion to bend it again at right angles upon itself, and means for effecting said oscillation.

11. In a machine of the class described, the combination of coil-spring-supporting means including adjustable curved guides, a former member cooperating with said guides to bend and clamp the spring end, and an oscillating former member engaging the spring adjacent to said clamp members, and means for giving said member an oscillatory movement through an arc of approximately ninety degrees.

12. In a machine of the class described, the combination of a coil-spring-supporting means, a horizontal oscillating former, a vertical oscillating former, stop means for regulating the length of the dowel, and means for operating said formers coördinately, said operating means including an intermittently-rotatable shaft.

13. In a machine of the class described, the combination of a bed-plate or equivalent support, a pivoted horizontal former, a pivoted vertical former, spring-supporting means upon said bed-plate relative to said formers, a drive-shaft, means intermediate of said shaft and formers whereby the formers are given a coördinate movement, and means for rotating the shaft intermittently.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN H. ROSS.

Witnesses:

S. H. NOURSE,
JESSIE C. BRODIE.