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C. L. HAIGHT.

HORSESHOE MACHINE.

No. 426,564. Patented Apr. 29, 1890.

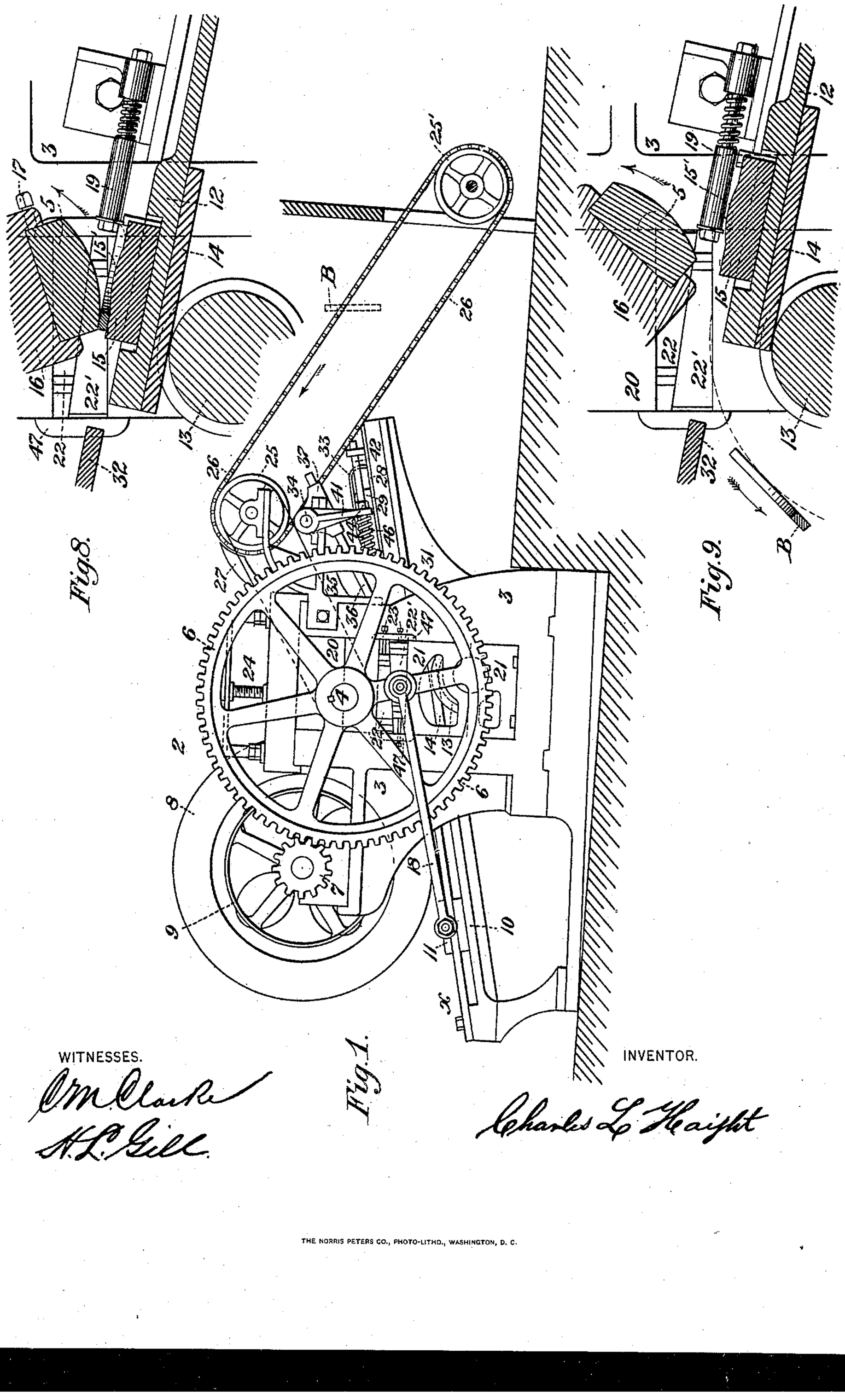

Fig. 8.

Fig. 9.

Fig. 1.

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INVENTOR.

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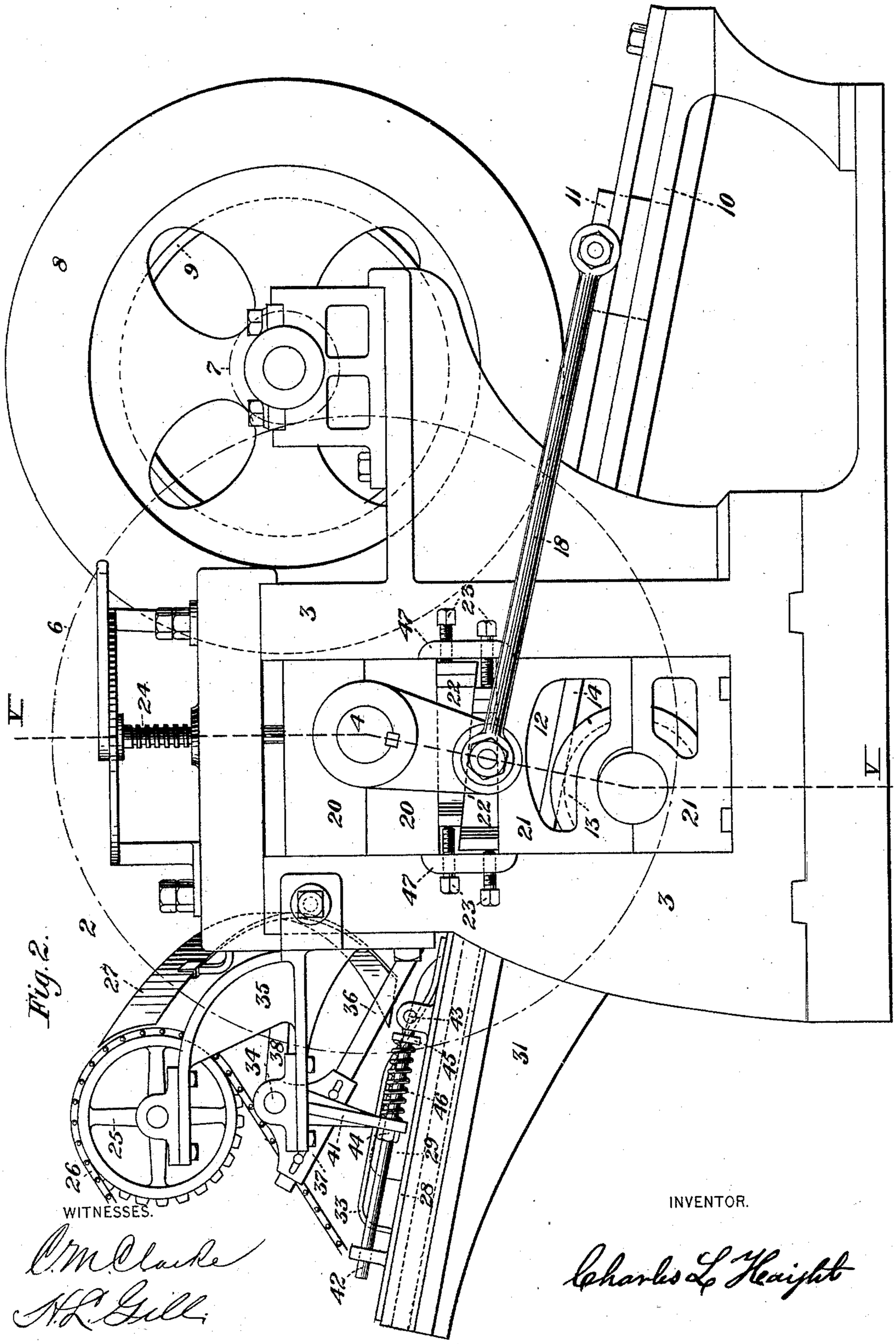

Fig. 2.

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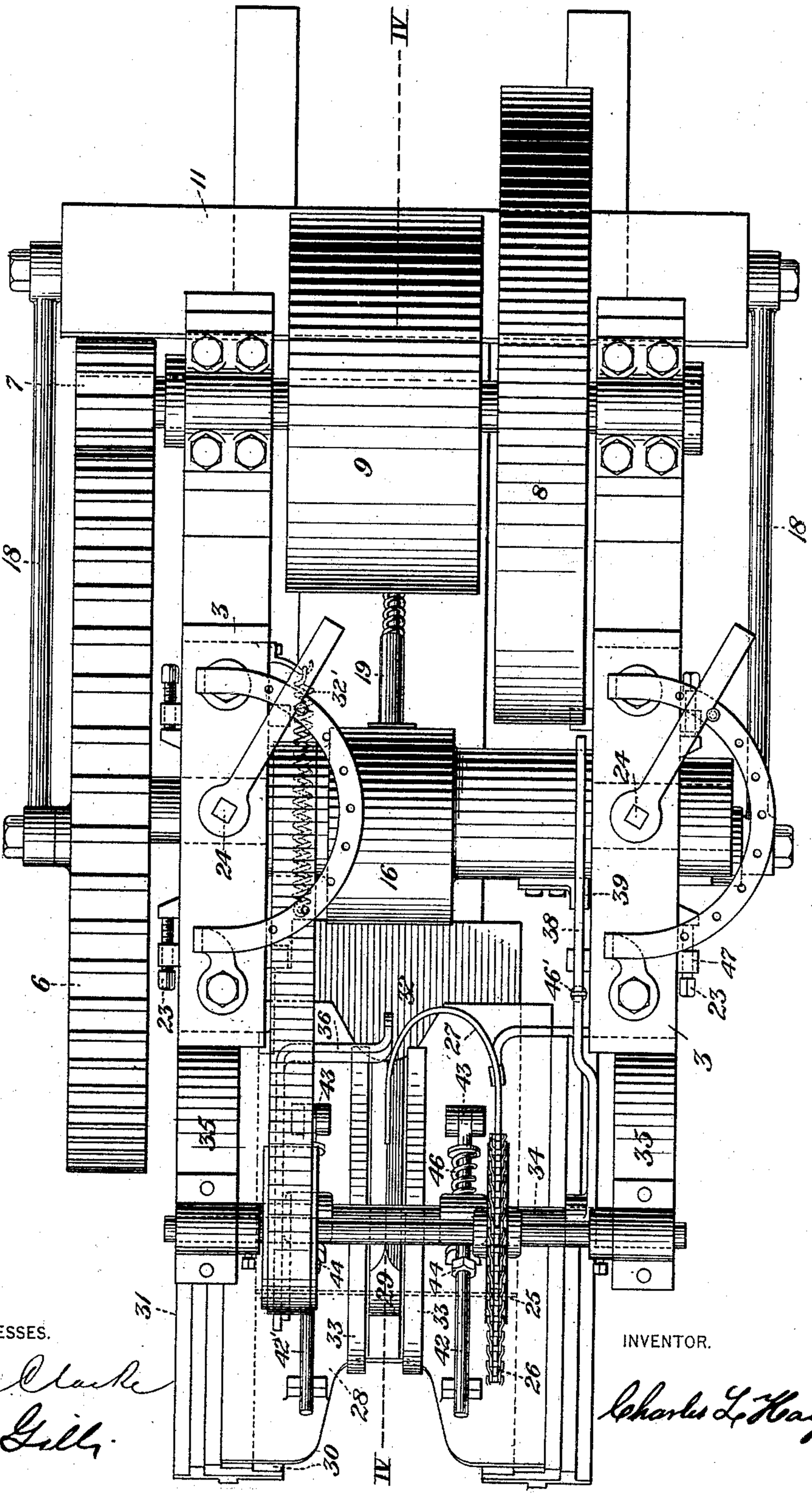

Fig. 3.

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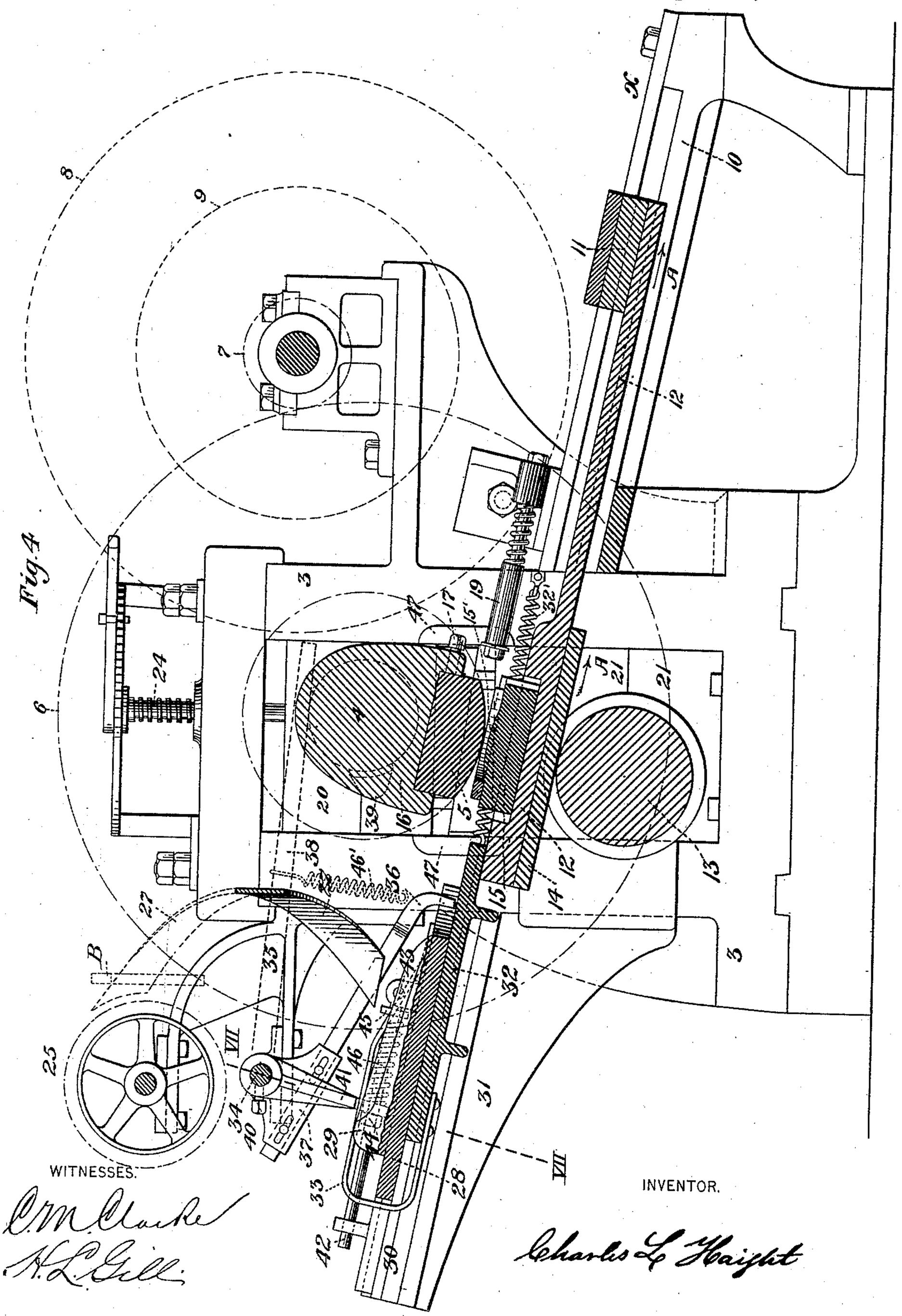

Fig. 4

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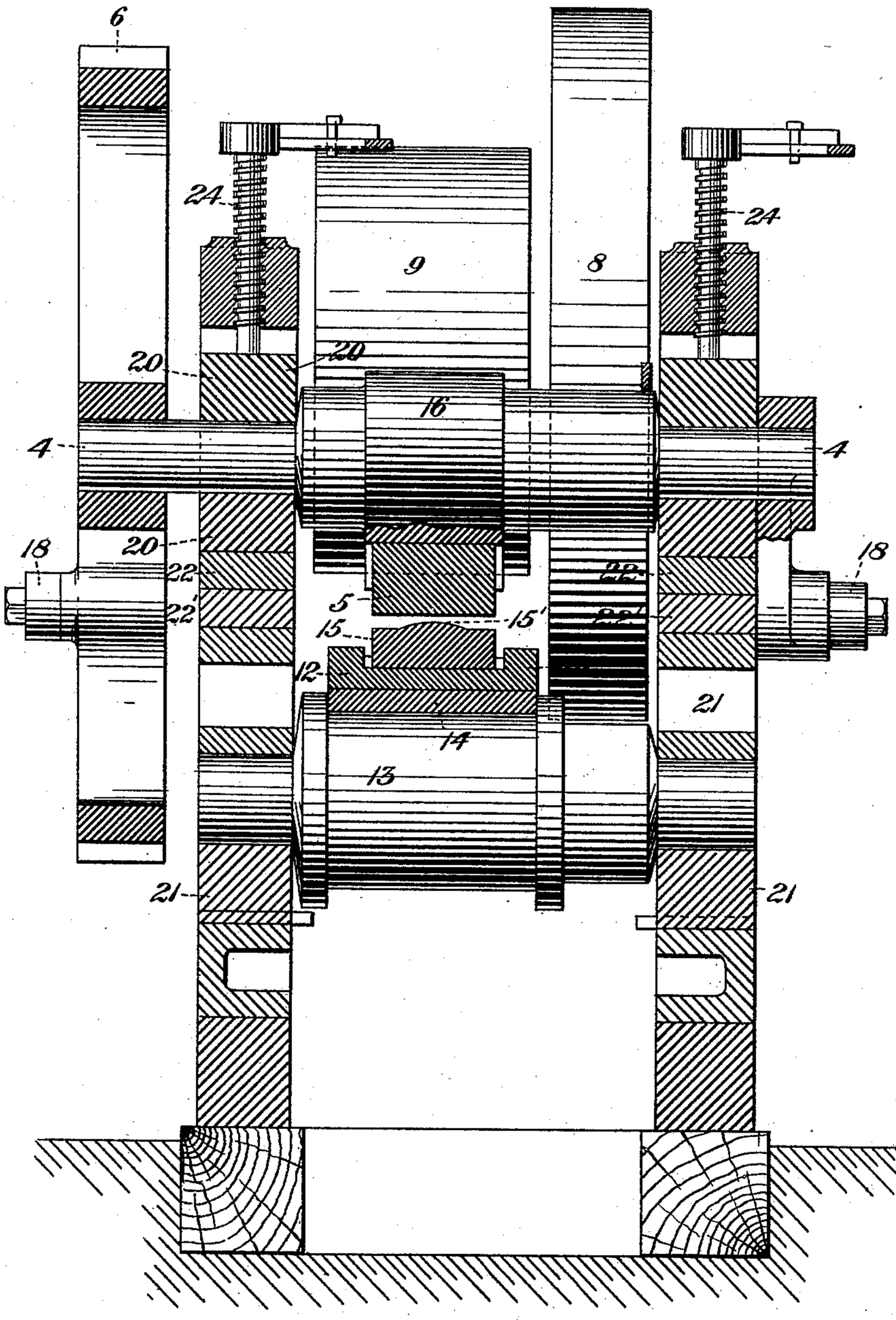
Fig. 5.



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HORSESHOE MACHINE.

No. 426,564. Patented Apr. 29, 1890.

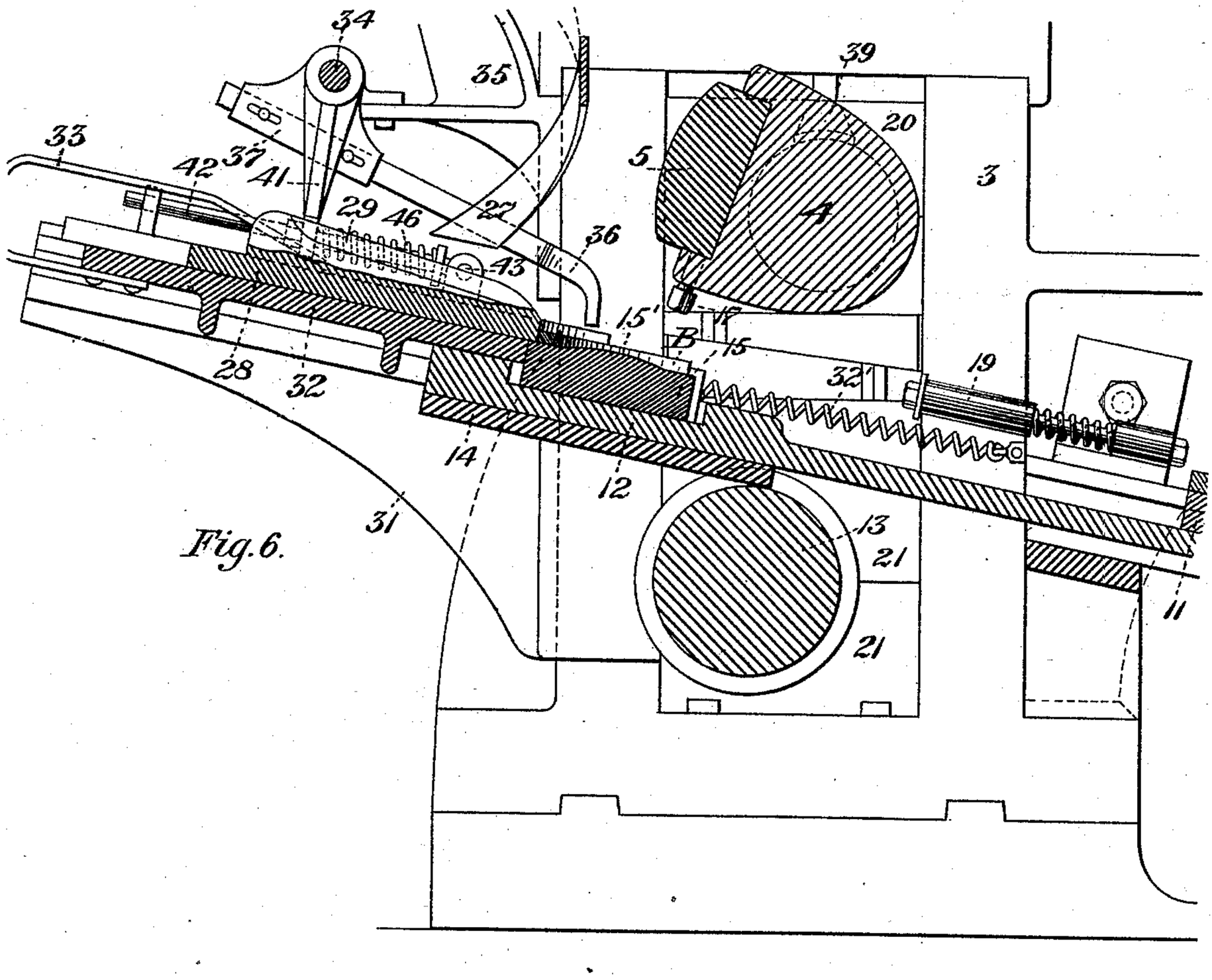
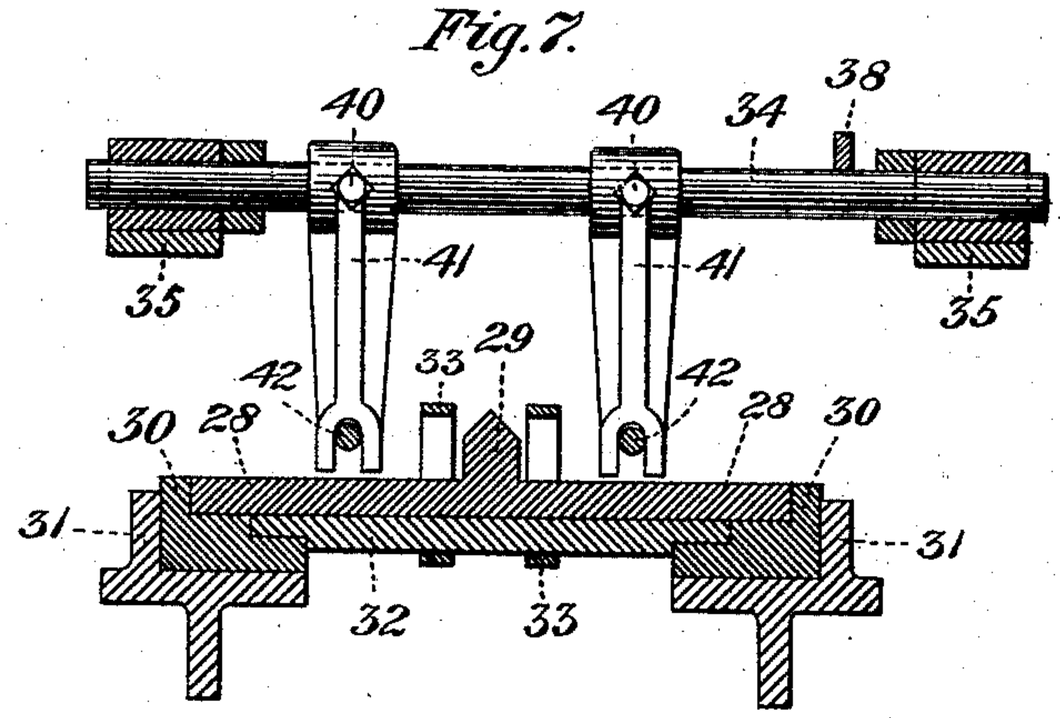


Fig. 6.

Fig. 7.



WITNESSES.

O. M. Clarke

H. L. Gill

INVENTOR.

Charles L. Haight

UNITED STATES PATENT OFFICE.

CHARLES L. HAIGHT, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO SHOENBERGER & CO., OF SAME PLACE.

HORSESHOE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 426,564, dated April 29, 1890.

Application filed February 17, 1890. Serial No. 340,669. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. HAIGHT, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Horseshoe-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 is an elevation of the other side of the machine. Fig. 3 is a plan view of the machine. Fig. 4 is a vertical longitudinal section on the line IV IV of Fig. 3. Fig. 5 is a vertical cross-section on the line V V of Fig. 2. Fig. 6 is a vertical longitudinal section, similar to Fig. 4, of the forward part of the machine, showing the operative parts in a different position from that shown in Fig. 4. Fig. 7 is a vertical cross-section of parts of the machine, the section being on the line VII VII of Fig. 4. Fig. 8 is a longitudinal section of parts of the apparatus. Fig. 9 is a similar section at a more advanced stage of the operation.

Like symbols of reference indicate like parts in each.

In Fig. 1, 2 represents the forward part of the machine in which the horseshoe-blank is bent into the required shape, no other parts of that machine being shown in the drawings.

3 is the frame or housing of the machine.

4 is the horizontal main shaft, which carries the revolving or upper die 5.

6 is a large gear-wheel on the main shaft, which gear-wheel is at the side of the machine shown in Fig. 1, and is in gear with a pinion 7 on the horizontal shaft of the fly-wheel 8, attached to which shaft is the driving-belt pulley 9.

10 are inclined parallel slide-bearings, in which a cross-head 11 is reciprocated by a pitman 18, which is connected with the cross-head 11 and eccentrically with the gear-wheel 6. These slide-bearings are at the rear side of the housings 3, which carry the bearings of the main shaft 4 and of an idler-roll 13.

12 is an inclined sliding table, the rear end of which is attached to the cross-head 11 and the forward end or head of which is provided with a shoe 14, which rests on a grooved portion of the idler-rolls 13. The table 12 has a recess in which the lower die 15 is fixed, which die is adapted to operate in conjunction with the upper die 5, which latter die is secured by a screw or screws 17 in a recess in a die-head or roll 16 on the shaft 4. The face of the revolving upper die 5 has a curvature concentric with the axis of its shaft, and the upper surface of the lower die 15 has a projection 15′ substantially corresponding in shape with that of the inner line of the bent horseshoe-blank. In the operation of the machine the bent shoe-blank B fits around this projection 15′ and is held in position by it, and the sliding table 12, which carries the lower die 15, being reciprocated in an inclined plane corresponding with the plane of the guides 10 in its motion in the direction of the arrow A, brings the die with the bent horseshoe-blank thereon beneath the rotary shaft 4, which is so geared as to cause the upper die 5 to engage the bent horseshoe-blank and to press it against the face of the lower die 15, and the upper die 5, having a surface speed somewhat greater than that of the lower die 15, not only compresses and trues and gives the required bevel to the blank, but by a wiping action smoothes and polishes it. As the dies continue their motion in the direction described, the heel end of the bent horseshoe-blank is pressed against a spring-ejector 19, which is compressed by the horseshoe, and when the dies recede far enough to release the blank the spring-ejector reacts and throws the shoe forward sufficiently far to cause it to drop through the machine, as hereinafter described.

It will be noticed that when the machine is in action and the parts in the position shown in Fig. 4 the lower die 15 is supported in its carrier 14 by the roll 13, and the line of force is the line between the axis of the roll and that of the shaft 4, and in the construction of the machine these parts are set so that this line shall be at right angles to the line of motion of the inclined sliding table 12. The line of compressing-force thus passes directly through the axes of the roll and shaft and through the middle of the dies, and consequently the best conditions for strength and effective work are secured.

The bearings 20 of the shaft 4 are set in

the housings and are separated from the bearings 21 of the idler-roll 13 by wedges 22 and 22′, which are placed one on top of the other between the bearings 20 and 21, as shown in Fig. 2, so that by their relative adjustment in opposite directions by set-screws 23 the distance between the shaft and roll may be slightly varied, as may be desired. When adjusted in proper position, the bearings of the shaft 4 are held down to work by housing-screws 24.

It remains to describe the devices by which the horseshoe-blank on being delivered from the bending-machine is carried to the lower die and properly placed thereon. At the forward end of the machine is placed on a bracket a sprocket-wheel 25, and an endless sprocket-chain belt 26 connects said wheel with a similar sprocket-wheel 25′ on the horseshoe-bending machine, as shown in Fig. 1. One or other of the sprocket-wheels 25 or 25′ should be power-driven. The horseshoe-bending machine is so constructed and arranged as to deliver each bent shoe-blank onto the sprocket-chain 26, so as to straddle the chain and be carried upwardly by the motion of the sprocket-chain to the top of the upper sprocket-wheel 25. Each blank as it passes over the upper sprocket-wheel 25 drops onto and straddles a downwardly-inclined guide 27, the position of which is shown in Figs. 1, 2, 3, and 4. The guide-plate 27 has preferably a reflex curved shape, as shown in the drawings, the purpose of which is to turn the bent horseshoe-blank B from a vertical position (as delivered from the bending-machine to the sprocket-chain 26) to a horizontal position, with its curved end or toe pointing toward the forward end of my machine. If, however, the blank should be delivered from the bending-machine in a different position, the guide 27 may be made straight instead of curved. This guide extends to the rear end of the rib 29, projecting upward from an inclined plate 28, which slides in bearings 30, supported by a pair of parallel brackets 31, projecting from the front end of the frame of the machine, which brackets 31 and slide-bearings 30 have a similar inclination to the guides 10 on the opposite sides of the housing or frame 3.

In order to furnish room for the reflection of the guide-plate 27 without separating the housings unduly, I place the revolving or upper die and the bearing-surface of the idler roll 13, not at the middle of the length of the shafts or axes, but to one side of the middle, as shown in Fig. 5. This arrangement accomplishes the above-stated purpose and affords a compact and strong structure.

On the slide-bearings 30 and under the plate 28 is a sliding table 32, which is connected by a coiled spring 32′ to the housing, as shown in Figs. 3 and 4. Two guide-strips 33, attached to the under side of the sliding table, extend upward and rearward over the plate 28, parallel with and near to the rib 29, one on each side of it, as shown in Figs. 2, 3, and 7. The object of these strips is to guide the horseshoe-blank while it is upon the rib 29. A lever-shaft 34, supported in bearings on a bracket 35 from the housing, carries a sleeve 37, which is firmly attached thereto, and within the sleeve is placed a hooked arm 36, which is adjustable therein, and the hooked end of which projects rearward and downward to a curved recess at the rear end of the sliding plate 28, which recess is shown more clearly in Fig. 3, and is adapted to receive the horseshoe-blank and is of substantially the same outline, though more flaring. The shaft 34 receives a slight rocking motion by means of a lever 38, (shown in dotted lines in Fig. 4,) which extends over the horizontal main shaft 4, and is adapted to be oscillated once in every revolution of the shaft by means of a cam 39 thereon. To the shaft 34 are also adjustably attached by set-screws 40 a pair of depending lever-arms 41, which are bifurcated at their lower ends so as to straddle rods 42 42′, pivoted at 43. On each of these rods is a screw-nut 44, and between the bifurcated end of each rocking arm 41 and a collar 45 on each of the pivoted rods 42 42′ is a spiral spring 46, as shown in Figs. 1, 2, 3, 4, and 6. By this arrangement, when the lever-arm 38 is raised by the cam 39, the hooked end of the arm 36 is lifted sufficiently to clear the sliding plate 28, and at the same time the lever-arms 41 compress the coiled springs 46, and the lever-arms 41 41′ are moved rearwardly against the action of their coiled springs 46, and thus impart a slight yielding forward motion to the sliding plate 28, as hereinafter described. The coiled spring 46′, also by its reaction, restores the parts to their original position after the passage of the cam 39. The operation of this part of the machine is as follows:

Suppose the parts to be in the position shown in Fig. 4. A bent horseshoe-blank being brought by the sprocket-chain 26 over the wheel 25 is delivered therefrom, as before described, upon the guide 27 and slides down said guide, from the lower end of which it is delivered with the heel portion foremost upon the rib 29 on the inclined plate 28. As shown in Fig. 9, the table 32 has just completed its rearward motion, and in such motion at any time after the fall of the hooked lever 36 the friction of the guide-strips 33, assisted by gravity, will feed the horseshoe-blank B down the inclined rib 29 until it falls into the curved recess at the end of the inclined plate 28, where it is held by the hook at the lower end of the arm 36. After the sliding table 12, carrying the lower die 15, has reached the point X at the completion of its downstroke and begins to move upwardly, it travels without affecting the table 32 until the end of the lower die engages the end of said table, when the latter will be pushed forward up the incline beneath the table 28, which remains at rest until the lower die comes into position shown in Fig. 6 and at the end of

its stroke immediately beneath the curved recess at the end of the plate 28. At this moment the cam 39, having reached the lever 38, lifts it, thereby raising the hooked arm 36, thus freeing the horseshoe-blank, and the lever-arms 41, being moved by the same motion against the force of their coiled springs 46, push the table 28 forward a short distance, so as to force the horseshoe-blank onto the lower die around the projection 15′ thereon. At this moment the parts are in the position shown in Fig. 6 and the table 12 is about to begin its rearward and downward stroke. In such motion the sliding table 32 is drawn with the sliding table 12 by the retractile force of the spring 32′ until it is arrested by a lug 47 on the side of the front end of the housing 3 at the time when the dies engage the horseshoe-blank, as shown in Figs. 2 and 4. As the blank is fed onward by the rotation of the upper die 5 and the backward motion of the lower die 15, the heel ends of the bent horseshoe-blank engage the front end of the spring-ejector 19, which is compressed as the dies recede until at the moment when the blank has passed beyond the grip of the dies the ejector suddenly reacts and projects the horseshoe-blank forward and off from the lower die 15. The table 32 remaining stationary and the sliding table 12 continuing its rearward motion, a space is left between the end of the table 32 and the sliding table 12, through which the ejected blank falls from the machine to the ground, as shown in Fig. 9. Meanwhile the lever 38, hooked arm 36, and depending arms 41 and inclined rib-plate 28 having been restored to their original position (shown in Fig. 4) by the passing of the cam 39 out of contact with the lever-arm 38 and by the reaction of the springs 46′, another bent horseshoe-blank is fed to my machine from the bending-machine, and in the continued motion of the parts the cycle of operation above described is repeated.

The chief advantage of my machine lies in the automatic feeding of the horseshoe-blank onto the lower finishing-die, which secures uniformity of action of the dies on the bent shoe-blank and corresponding uniformity of finish. This is an exceedingly important matter, as it is found impossible to secure this uniformity where the shoe is fed by hand between the dies, as in taking hold of the hot shoe-blank and placing it in the lower die it is very apt to be slightly shifted from its position, even if it had been correctly placed, the result of which would be want of uniformity in shape of the finished shoe. This automatic feed, aided by the inclined position of the inclined plate 28 and its rib and of the lower die, not only aid the shoe-blank in its passage to the die, but give it a tendency toward the projection 15′ in the lower die 15, causing it to rest against it and prevent its being shifted backward or to one side before the upper die comes in contact with it.

What I claim is—

1. The combination, with a horseshoe-bending machine and a finishing-machine, of a sprocket-chain carrier to receive the bent horseshoe-blanks and deliver them to the finishing-machine, and an inclined guide to carry the bent blanks to the finishing-dies, substantially as and for the purposes described.

2. The combination, with a horseshoe-bending machine and a finishing-machine, of a carrier for delivering the bent blanks from the former to the latter, consisting of an endless chain which the blank straddles, so that on the revolution of the chain they drop into the finishing-machine, substantially as and for the purposes described.

3. In combination with a pair of dies for straightening and finishing horseshoe-blanks, an inclined feed-table for assisting the forward motion of the blank toward the finishing-dies, substantially as and for the purposes descibed.

4. In combination with a device for delivering a bent horseshoe-blank from a bending-machine, a reflex curved downwardly-inclined guide for conducting the blanks toward the straightening-dies, substantially as described.

5. The combination, with a device for delivering a bent horseshoe-blank from a bending-machine, of an inclined guide, and a guide-rib for receiving the horseshoe-blank and depositing the same in front of the finishing-dies, substantially as described.

6. The combination of an inclined reciprocating supporting-table and the reciprocating die-table, which moves with the supporting-table and carries the die under the blank as the supporting-table is removed from under the same, substantially as and for the purposes described.

7. The combination of an inclined reciprocating supporting-table, the reciprocating die-table which moves with the supporting-table and carries the die under the blank as the supporting-table is removed from under the same, a pushing-table 28, operating to adjust the blanks in the die, and mechanism for actuating the pushing-table, substantially as and for the purposes described.

8. The combination of an inclined reciprocating supporting-table, the reciprocating die-table which moves with the supporting-table and carries the die under the blank as the supporting-table is removed from under the same, and mechanism for holding the blank on the supporting-table, said mechanism being actuated to release the blank, substantially as and for the purposes described.

9. The combination of an inclined reciprocating supporting-table, the reciprocating die-table which moves with the supporting-table and carries the die under the blank as the supporting-table is removed from under the same, a lever 38′ for holding the blank, and a cam-actuated rock-shaft by which the lever is moved, substantially as and for the purposes described.

10. The combination of an inclined reciprocating supporting-table, the reciprocating die-table which moves with the supporting-table and carries the die under the blank as the supporting-table is removed from under the same, mechanism for holding the blank on the supporting-table, a pushing-table 28, and actuating devices common to the table 28 and to the holding mechanism, substantially as described.

11. The combination, with the upper and lower dies and the spring-ejector, substantially as described, of the tables arranged and operated to afford a space through which the blank is delivered at the time of ejection from the dies, as and for the purposes described.

12. The combination, with the inclined die-table, of a supporting-roll and rotary die, the axes of said roll and die being situated so that the plane intersecting their axes shall not be vertical, but shall be so inclined as to be at right angles to the plane of inclination, substantially as described.

13. In a machine for finishing bent horseshoe-blanks, the combination, with an upper die roll or shaft, an inclined sliding lower die, and an idler-roll for supporting the lower die, of adjustable wedge-shaped blocks placed heel to toe between the journal-bearings of the die-roll and idler-roll, substantially as and for the purposes described.

14. In a machine for finishing bent horseshoe-blanks, the combination of a rotary or reciprocating upper die and a reciprocating inclined lower die, with devices, substantially such as described, for automatically feeding the bent horseshoe-blank onto the lower finishing-die.

In testimony whereof I have hereunto set my hand this 12th day of February, A. D. 1890.

CHARLES L. HAIGHT.

Witnesses:
W. B. CORWIN,
H. M. CORWIN.