(No Model.) 6 Sheets—Sheet 1.

J. A. BURDEN.

HORSESHOE MACHINE.

No. 391,779. Patented Oct. 30, 1888.

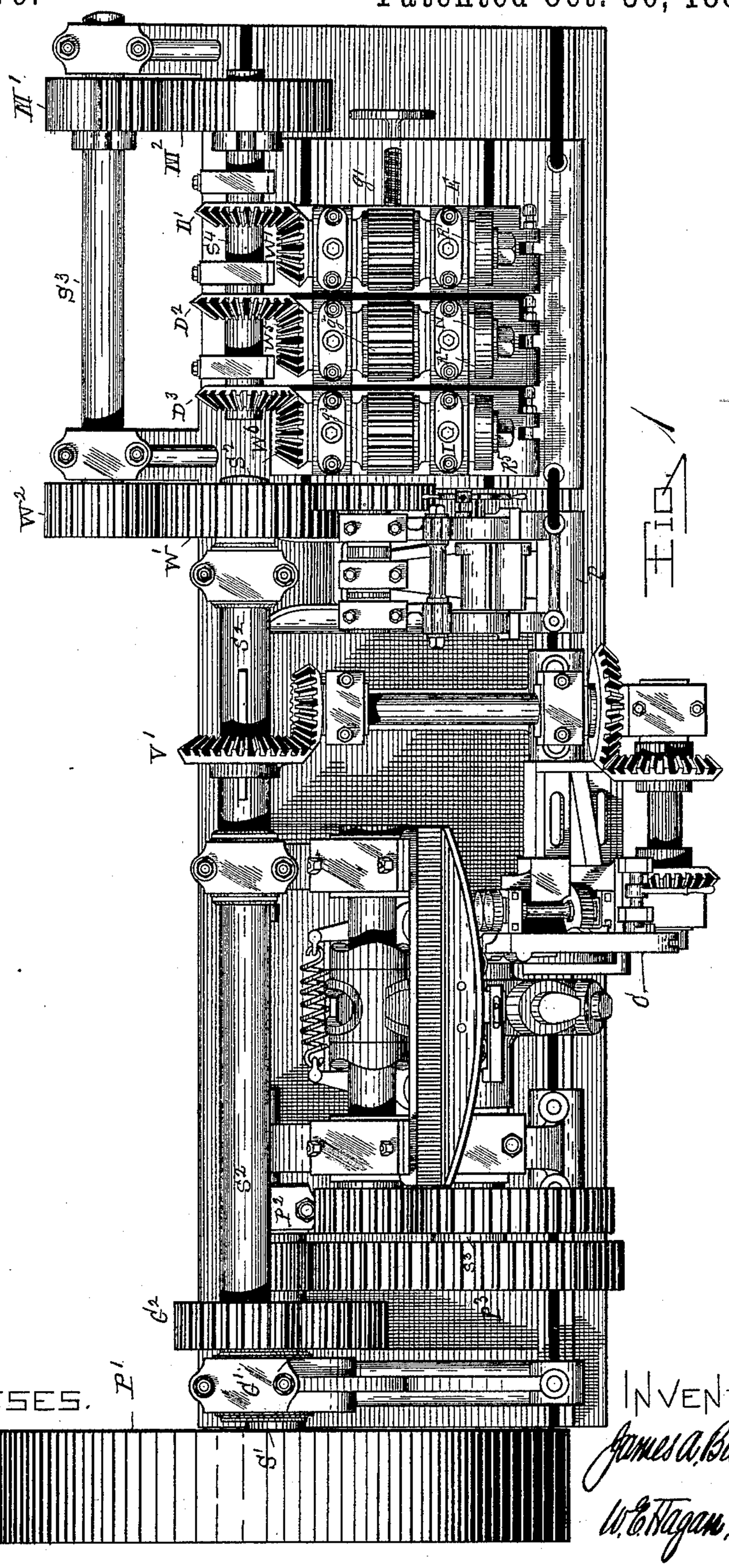


FIG. 1.

WITNESSES.

Geo. A. Darby.

Charles D. Burchall

INVENTOR.

James A. Burden by

W. E. Hagan, atty.

(No Model.)

6 Sheets—Sheet 2.

J. A. BURDEN.

HORSESHOE MACHINE.

No. 391,779. Patented Oct. 30, 1888.

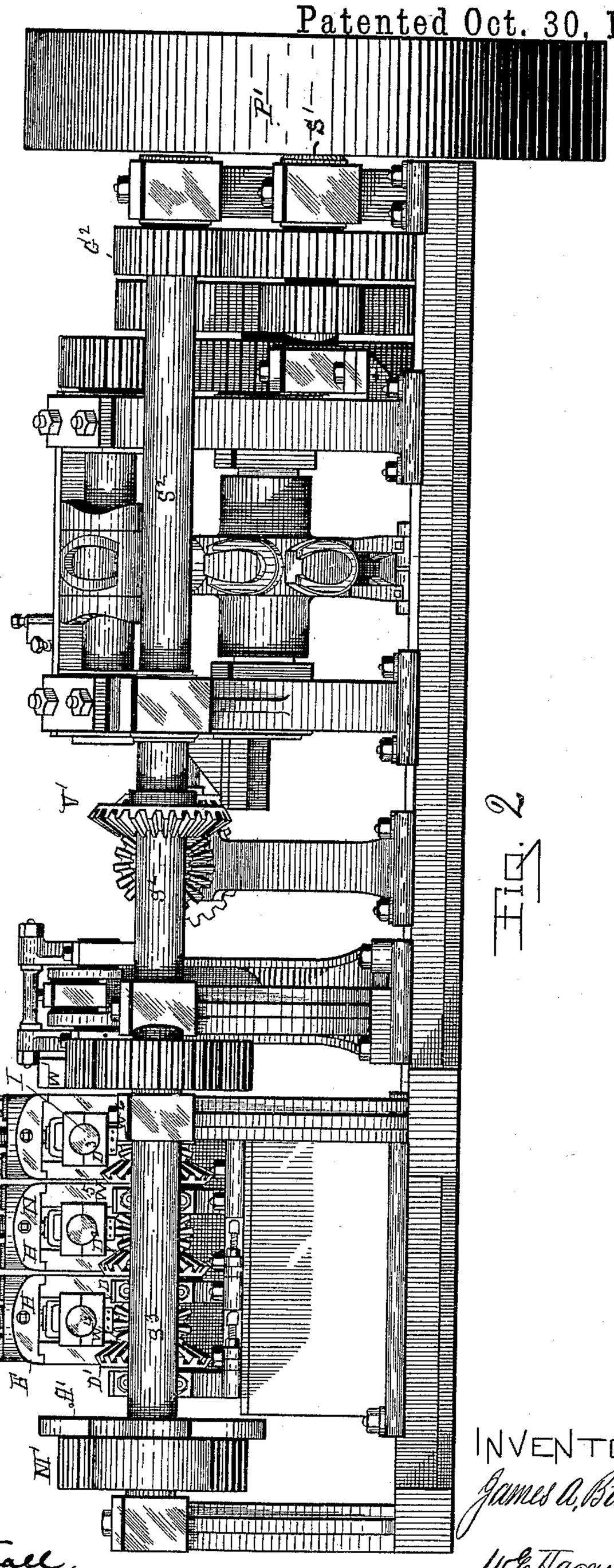


FIG. 2

WITNESSES.

Geo. A. Darby.

Edward S. Bumstead.

INVENTOR.

James A. Burden by

W. E. Hagan, his Atty.

(No Model.)

6 Sheets—Sheet 3.

J. A. BURDEN.

HORSESHOE MACHINE.

No. 391,779. Patented Oct. 30, 1888.

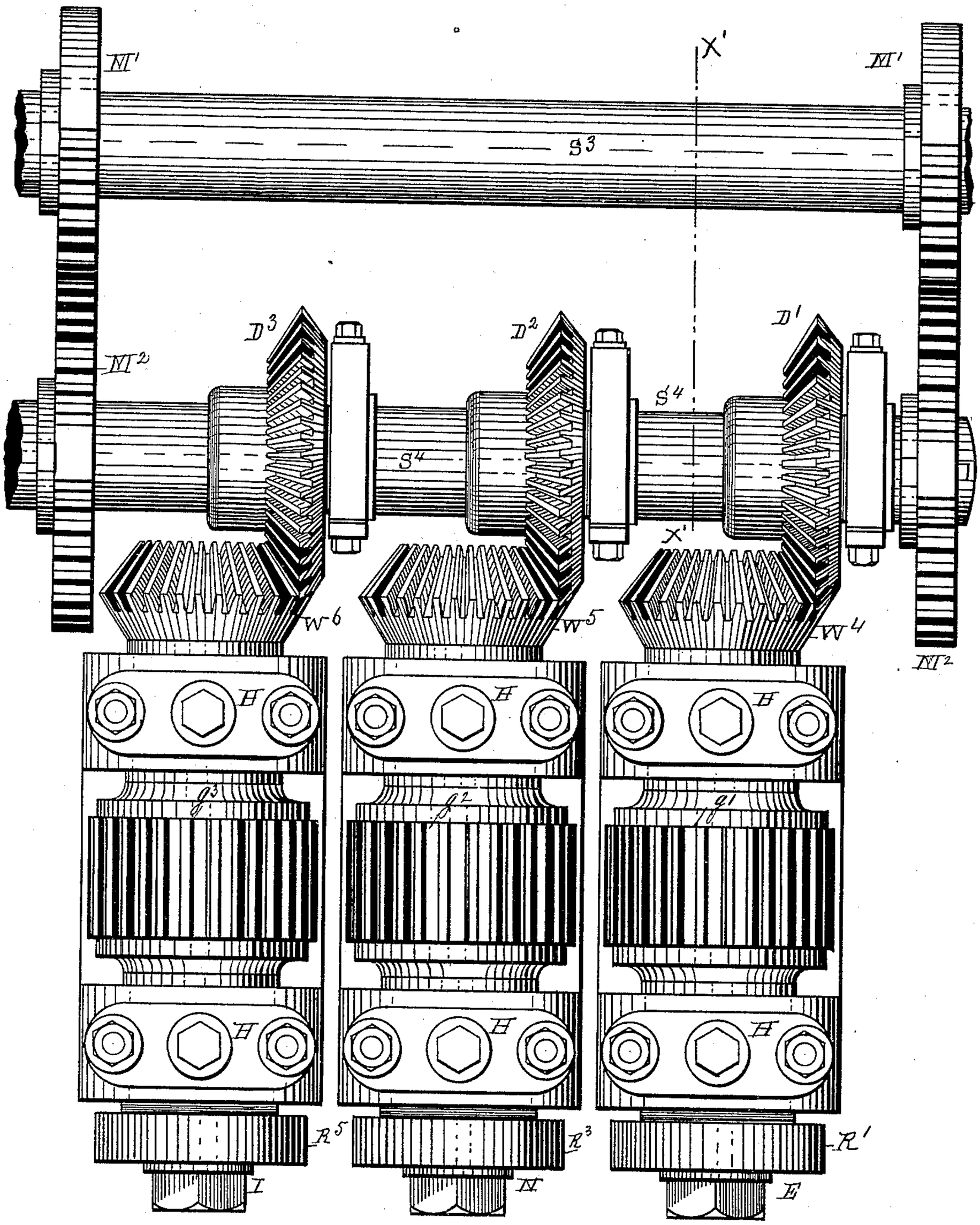


Fig. 3.

WITNESSES.

Geo. A. Darby.

Charles S. Brimhall.

INVENTOR.

James A. Burden by

W. E. Hagan. his atty.

(No Model.) 6 Sheets—Sheet 4.

J. A. BURDEN.

HORSESHOE MACHINE.

No. 391,779. Patented Oct. 30, 1888.

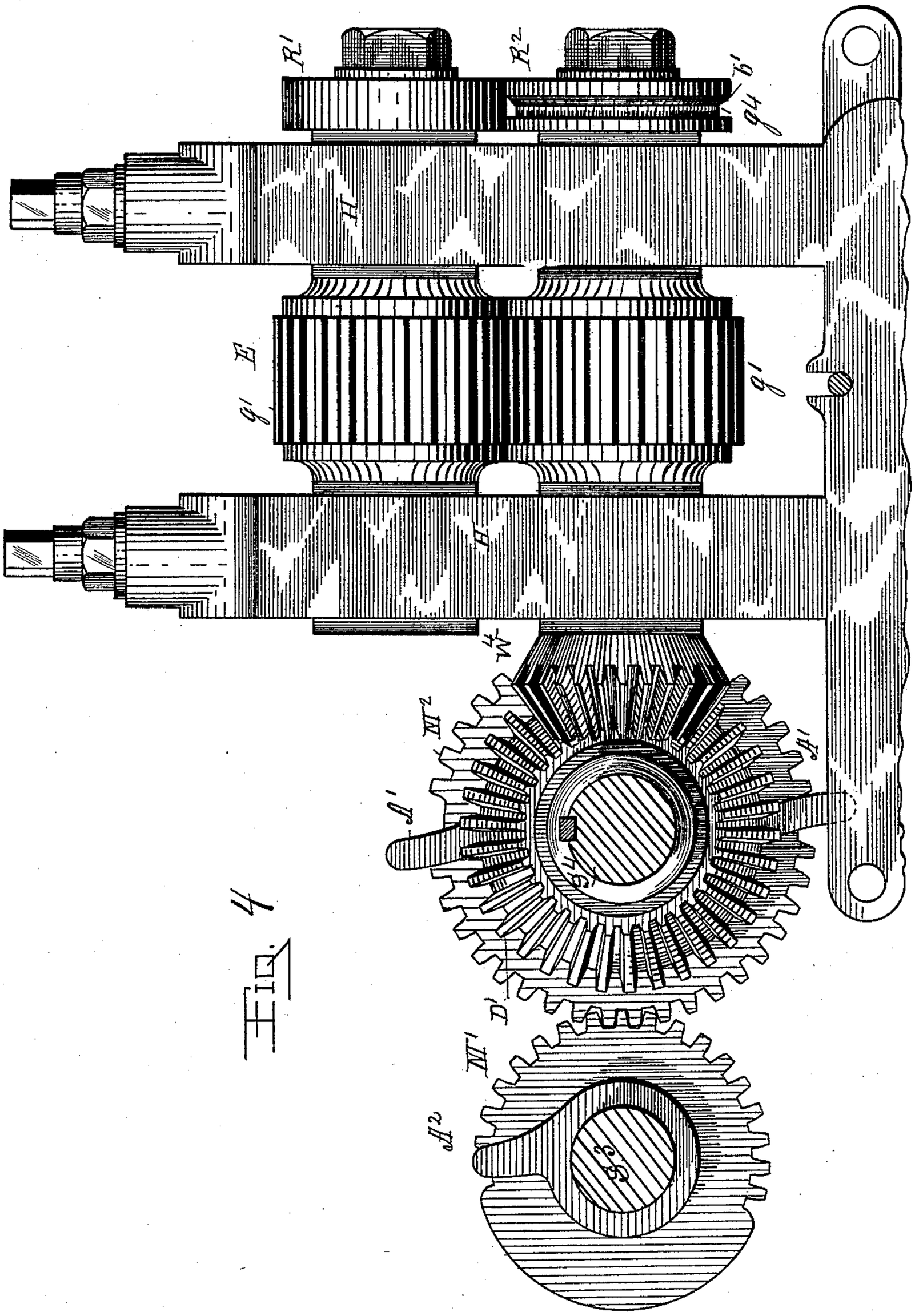


FIG. 4

WITNESSES.
Geo. A. Darby.
Charles S. Brimhall.

INVENTOR.
James A. Burden. by
W. E. Hagan. his atty.

(No Model.)

6 Sheets—Sheet 5.

J. A. BURDEN.

HORSESHOE MACHINE.

No. 391,779. Patented Oct. 30, 1888.

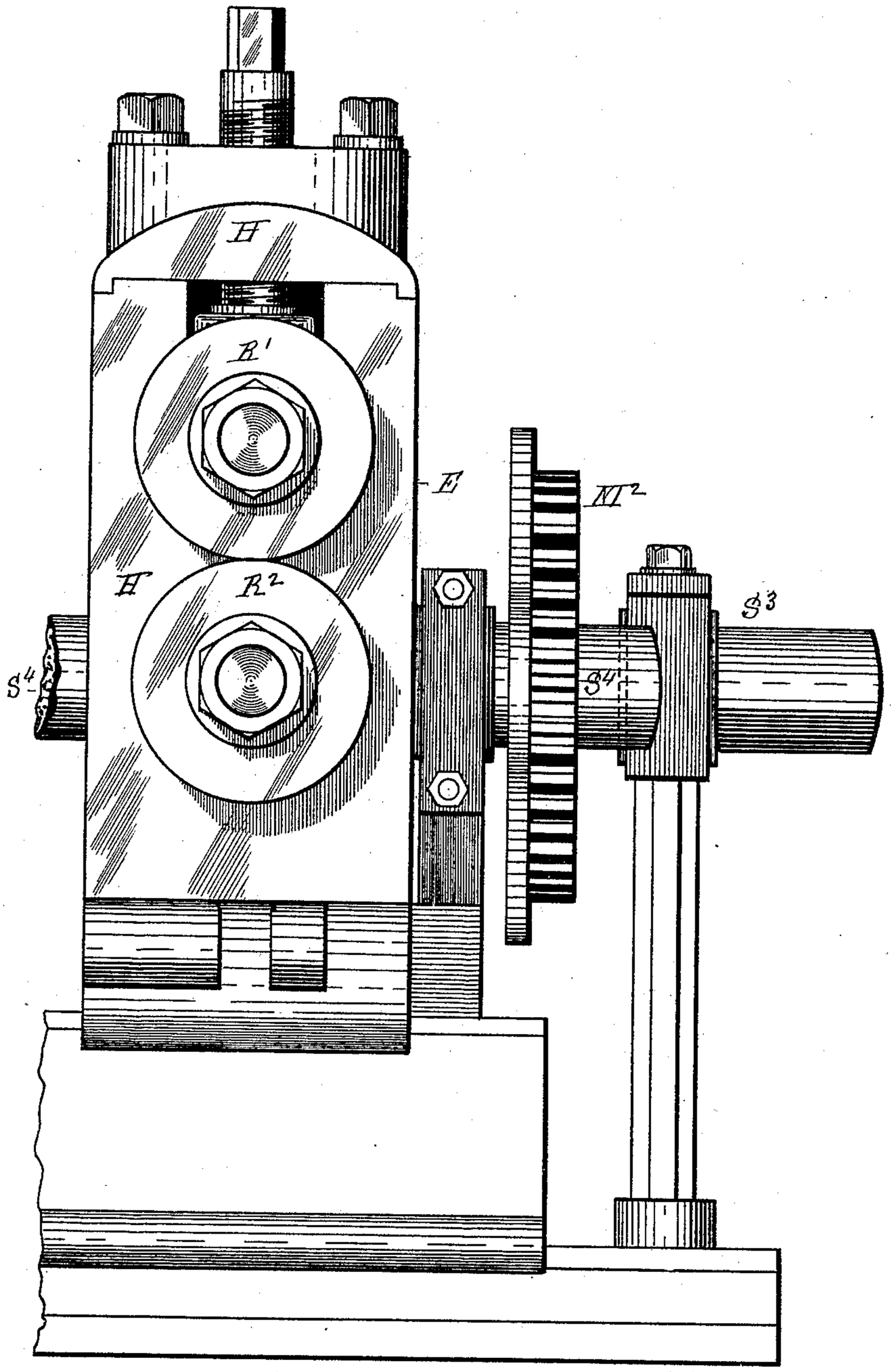


Fig. 5

WITNESSES.
Geo. A. Darby.
Charles S. Bintnall.

INVENTOR.
James A Burden.
by W. E. Hagan his atty.

(No Model.)

6 Sheets—Sheet 6.

J. A. BURDEN.

HORSESHOE MACHINE.

No. 391,779. Patented Oct. 30, 1888.

Fig. 6

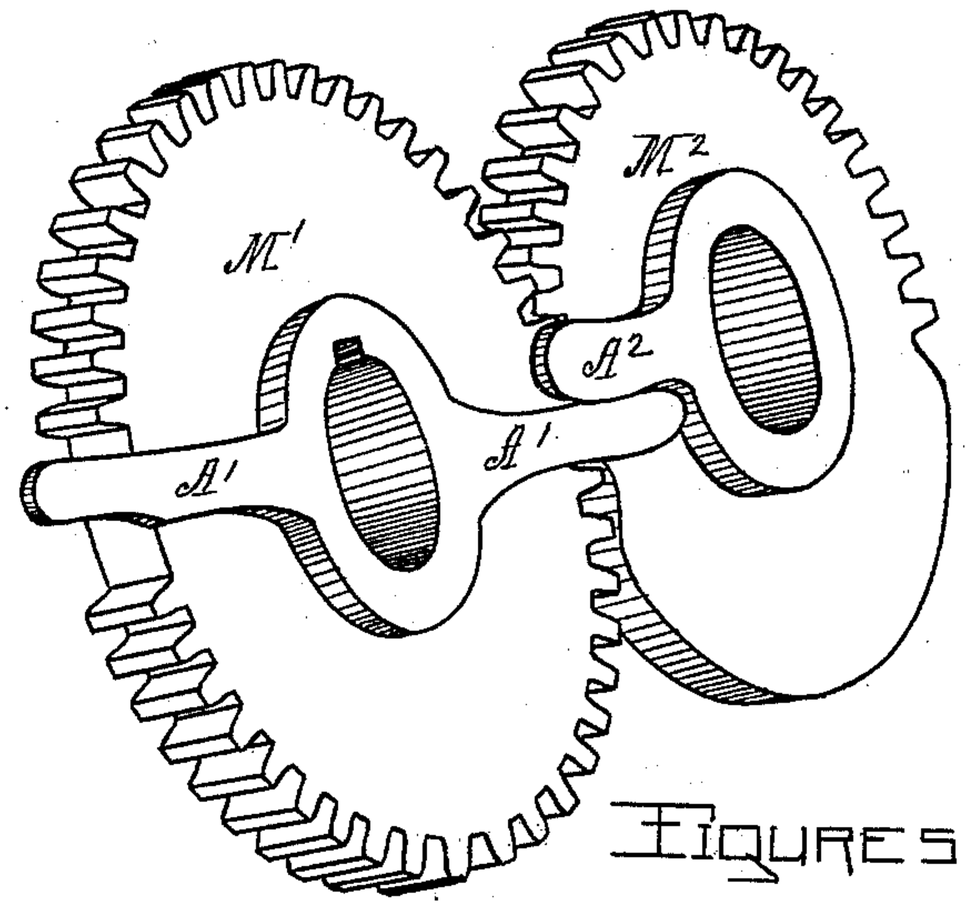


Fig. 14

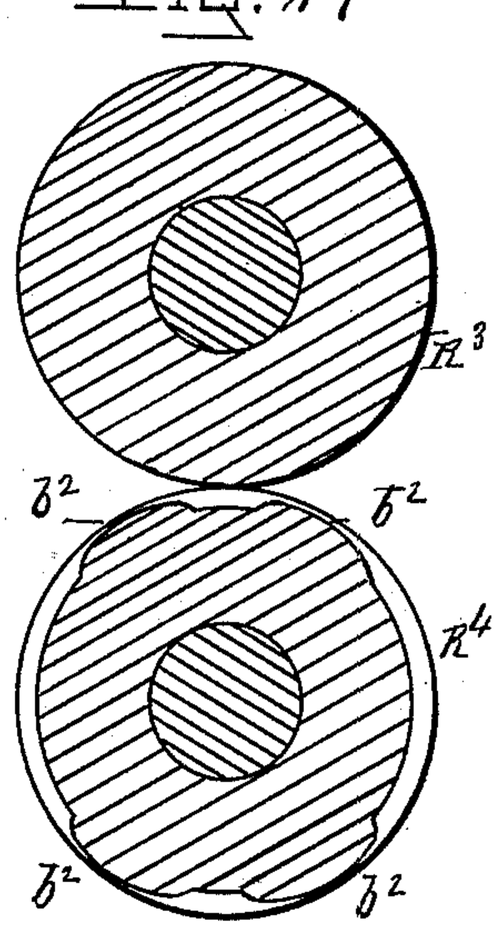
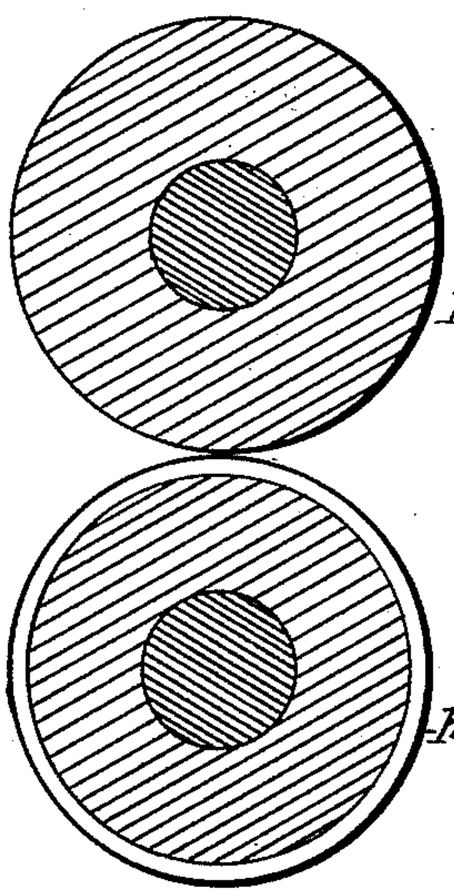


Fig. 7



FIGURES 8 9 10 11 12 13.

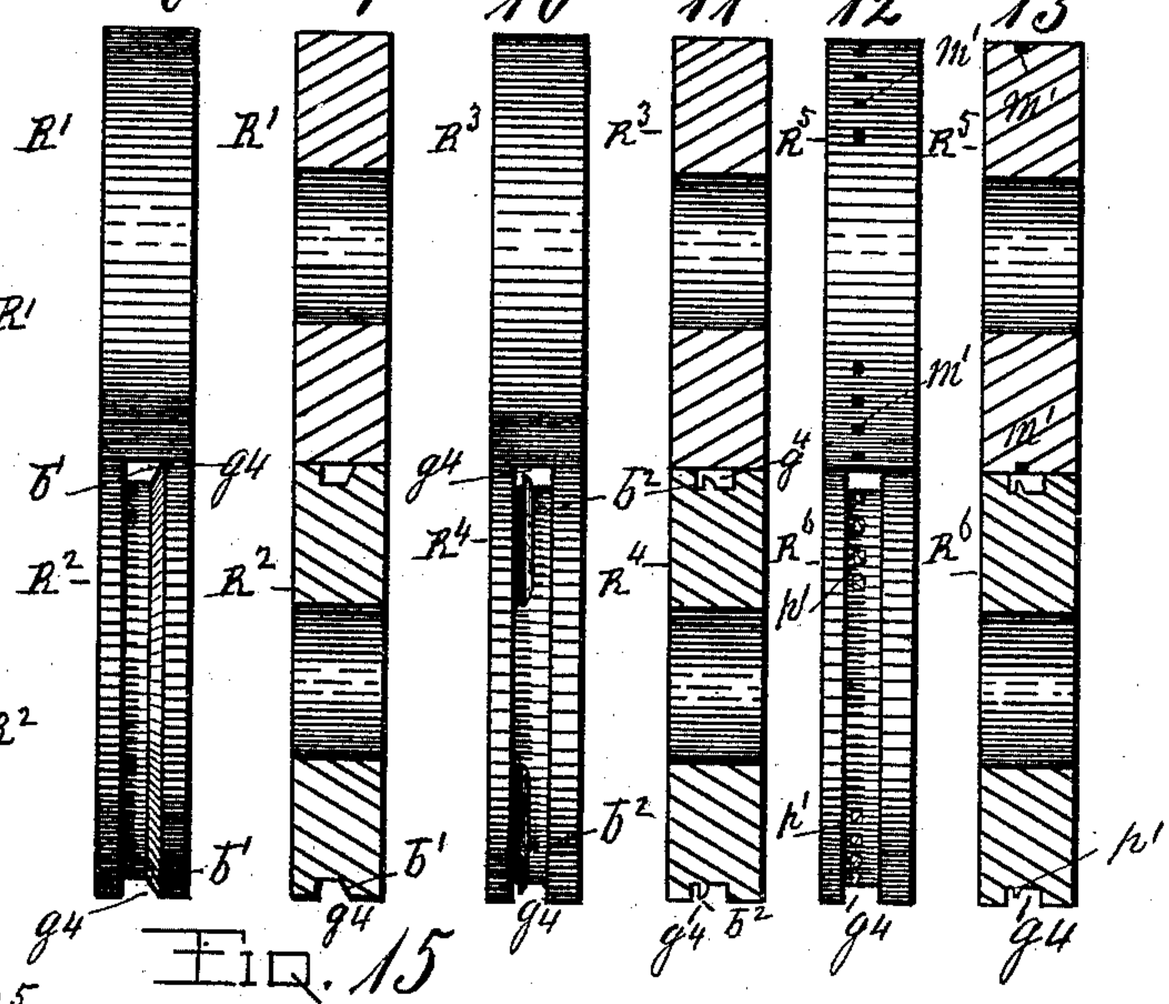
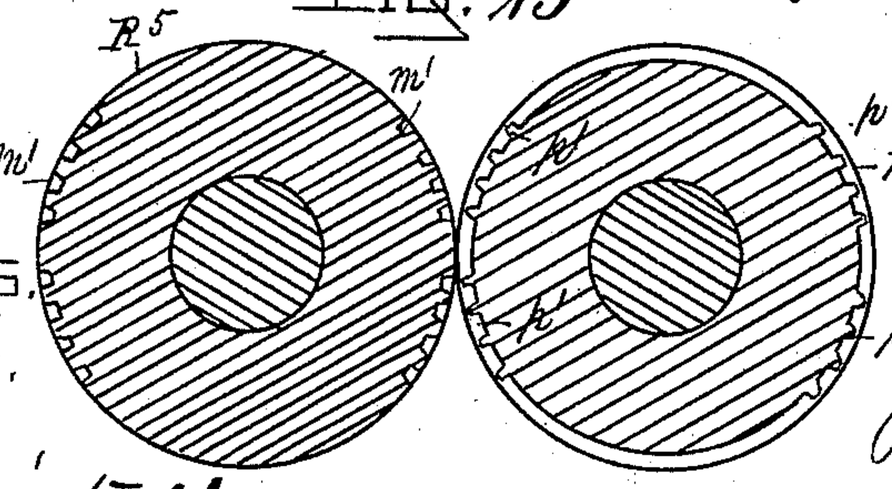


Fig. 15



WITNESSES.

Geo. A. Darby.

Charles S. Brintnall.

INVENTOR.

James A. Burden.

by W. E. Hagan, atty.

UNITED STATES PATENT OFFICE.

JAMES A. BURDEN, OF TROY, NEW YORK.

HORSESHOE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 391,779, dated October 30, 1888.

Application filed April 14, 1888. Serial No. 270,885. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. BURDEN, of the city of Troy, county of Rensselaer, State of New York, have invented new and useful Improvements in Horseshoe-Machines, of which the following is a specification.

My invention relates to a mechanism for operating the shaping or entering, the creasing, and the rough-punching rolls of a machine for making horseshoes, and in which machines it is necessary that the bar of iron operated upon to produce shoe-blank lengths that are to be shaped, creased, rough-punched, full-punched, cut off, and swaged shall be moved with regular periods of motion and alternating periods of rest, it being the object and purpose of my invention herein to so move the bar as thus operated upon by means of a regularly-intermittent motion of the rolls, performing in sequence the several functions of shaping, creasing, and rough-punching, as distinguished from continuously-moving rolls that have upon their perimeters engaging and non-engaging segments, which move the bar as operated upon with regular periods of motion and alternating periods of rest, as shown and described in an application for Letters Patent made by me and filed in the United States Patent Office January 7, 1888, Serial No. 260,058, and which is now pending.

Accompanying this specification, to form a part of it, there are six plates of drawings containing fifteen figures illustrating my invention, with the same designation of parts by letter-reference used in all of them.

Of these illustrations, Figure 1 shows a top view of a machine for making horseshoes from a bar of heated iron by a continuous operation, with my invention, as shown and described herein, applied thereto to operate the rolls thereof. Fig. 2 shows a side elevation of the same machine that is illustrated at Fig. 1, with that side of the machine at which power is applied to the rolls fronting the view. Fig. 3 is a top view of the three sets of rolls by which the bar is entered, shaped, creased for the nail-holes, and rough-punched, showing, also, a mutilated gear of the same peripheral capacity upon each end of the counter-shaft and two mutilated gears of the same perimetral capacity upon the driving-shaft, each of which is adapted to intermittently engage with one of the mutilated gears upon the counter-shaft, so as to give to the latter and the rolls which it operates an intermittent motion, while at Figs. 1 and 2 there is but one set of such mutilated gears used upon the driving and counter shafts. Fig. 4 is a view of the entering and shaping rolls in elevation and taken with the fronting edges of the rolls as facing the view, with the driving and counter shafts shown in section taken on the line $x' x'$ of Fig. 3, showing, also, the beveled gear upon the lower roller-shaft and the beveled gear upon the counter-shaft, and also the mutilated gears back of said beveled gears. Fig. 5 is an end view of the entering and shaping rolls and their housings. Fig. 6 is a perspective of the mutilated gear of the counter-shaft and also that one upon the driving-shaft. This figure illustrates, also, a promoter-arm that is arranged upon the mutilated gear of the counter-shaft, and it shows, also, a cam-arm that is arranged upon the mutilated gear that is upon the driving-shaft. Fig. 7 is a section of the entering or shaping rolls, taken parallel to their sides. Fig. 8 is an edge elevation of the entering or shaping rolls. Fig. 9 is a diametrical section of the entering or shaping rolls. Fig. 10 is an edge elevation of the creasing-rolls. Fig. 11 is a diametrical section of the creasing-rolls. Fig. 12 is an edge elevation of the rough-punching rolls. Fig. 13 is a diametrical section of the rough-punching rolls. Fig. 14 is a section of the creasing-rolls, taken parallel to their sides; and Fig. 15 is a section of the rough-punching rolls, taken parallel to their sides, with the latter shown as turned down upon their edges instead of being one placed above the other, as in the other figures.

The several parts of the mechanism thus illustrated are designated by letter-reference, and the function of the parts is described as follows:

The letter P′ indicates the driving-pulley, and S′ its shaft; G′, a gear-wheel arranged upon the latter to turn with it. This gear-wheel G′ meshes into a gear-wheel, G^2, on the shaft S^2, which latter is extended frontwardly to operate the cutting mechanism C and the full-punching mechanism P by separate geared connections made therewith.

The letter W′ designates a gear-wheel arranged on the front end of the shaft S^2, which

gear-wheel meshes into the gear-wheel W^2 on the shaft S^3 to communicate motion to the latter. The letter M′ designates a mutilated gear-wheel, that is arranged on, so as to turn with, the shaft S^3. This gear-wheel M′ has its gears omitted on a portion of its perimeter, as shown at Fig. 6. This mutilated gear-wheel M′ is constructed with a promoter-arm, A′, that is projected from the wheel so as to move with it.

The letter M^2 designates a mutilated gear-wheel arranged upon the shaft S^4, so as to actuate the latter when said mutilated gear-wheel M^2 is rotated. This mutilated gear-wheel M^2 is constructed with a cam-arm, A^2, upon its side, and where this cam-arm projects beyond its perimeter the gear-teeth thereat are omitted. The function of these mutilated gear-wheels M′ and M^2 is to operate the shafts S^4 with regular periods of motion and alternating periods of rest by having the teeth on the wheel M′ mesh into those of the wheel M^2 when the gear parts of these perimeters come together in rotation, and to omit to operate said shafts S^4 when the blank places on the wheel M′ in rotation are passing over the perimeter of said wheel M^2. The function of the promoter-arm A′ upon the mutilated gear-wheel M′ is to engage with the cam-arm A^2 on the mutilated gear-wheel M^2, so as to start the rotation of the latter before the geared part on the perimeter of the mutilated gear-wheel M′ commences to mesh into the teeth of the wheel M^2, and to thus in part take off from the engaging teeth the strain of starting the shaft. The gear parts of the mutilated gear-wheel M′ and M^2 are so arranged as to their intermittent engagement that they will (in connection with the movement made by the promoter and cam) give the shaft S^4 about a half-revolution with an alternating period of rest between each half-revolution.

The letters E designate the entering or shaping rolls.

The letters N designate the creasing-rolls, and the letters I the rough-punching rolls.

The letter R′ designates the upper one of the entering or shaping rolls E, and R^2 the lower one of the latter. Each of these rolls is provided with bearings in the housings H, and the shafts of these entering-rollers are each constructed with gears g', that mesh into each other to communicate power from one to the other.

The letter W^4 designates a beveled gear on the shaft of the lower one of the shaping or entering rolls, and this beveled gear W^4 meshes into a beveled gear, D′, on the shaft S^4, by which power is communicated to said rolls R′ and R^2.

The letter R^3 designates the upper one of the creasing-rolls N, and R^4 the lower one of the latter rolls, and these rolls are made with connecting-gears g^2, by which motion and power is communicated from one to the other of them.

The letter W^5 designates a beveled gear on the shaft of the lower roll R^4 of the creasing-rolls, and B^2 a beveled gear-wheel on the shaft S^4, by which power is communicated to said creasing-rolls N.

The letters R^5 designate the upper one of the rough-punching rolls I, and R^6 the lower one of the latter. These rolls are made with connecting-gears g^3, by which power is communicated from one to the other of them.

The letter W^6 designates a beveled gear on the shaft of the lower roll R^6 of said rough-punching rolls, and D^3 a beveled gear-wheel on the shaft S^4, by which power is communicated to the said rough-punching rolls.

The upper roll R′ of the shaping or entering rolls is plain on its peripheral face, and the lower roll R^2 of this set of rolls has a groove, g^4, made in the roller-face to encircle the latter. This groove, when used to shape the bar so as to form mud or snow shoes, is made with a bevel, b', on one of its sides, and this groove is preferably in its cross-section made to be a little smaller than the entering-bar, so that the bar as received and entered will, as each blank-length thereon is shaped, be moved through the rolls with expelling force.

The upper roll R^3 of the creasing-rolls is made with the surface of its perimeter plain, and the lower roll R^4 of this series is made with a groove, g^4, within its perimeter. This groove has two sets of creasing-blades, b^2, arranged therein diametrically opposite, each of which at every half-revolution of the rolls creases a blank-length of the heated bar for the nail-holes.

The upper roll R^5 of the rough-punching rolls has a plain perimetral face, having therein arranged at diametrically-opposite points two series of sinks, m', and the lower roll R^6 of the rough-punching series is made on its perimetral face with a groove, g^4, therein, within which there are arranged at diametrically-opposite points two series of punches, p', and these two series of punches are each arranged as the two rolls are rotated so that they each of them will come diametrically in line with each series of sinks in the upper roll, and each punch of each series will come diametrically in line with one of the sinks in the upper roll as these two rough-punching rolls are rotated.

The letter P^2 designates a pinion on the driving-shaft that meshes into a gear-wheel, P^3, on the shaft S^3, by which the swaging and bending mechanism is operated to shape a blank-length that has been cut off from the entering end of the bar by the cutting mechanism.

The letters V′ designate a gear-wheel upon the shaft S^2, by means of which a counter-shaft connection is made to operate the cutting mechanism C.

The letters W′ designate a gear-wheel on the shaft S^2, by which the full-punching mechanism is operated.

As thus constructed and arranged, the swaging and bending mechanism and the shaft S^2 are constantly moving when the mechanism is running, and the full-punching and the cut-

ting mechanism are arranged to operate upon the previously-worked blank-lengths of the bar while the latter is at rest.

The operation of the several sets of rolls thus described is as follows: The shaft S^3, receiving power from the shaft S^2, is constantly turning while the machine is running, and as is also the mutilated gear-wheel M′, arranged thereon. When that part of the perimeter of the mutilated gear-wheel M′ containing the gear-teeth in turning engages with the teeth upon the perimeter of the mutilated gear-wheel M^2, it during such engagement will turn the said gear-wheel M^2 until that part of its perimeter comes around where there are no gears, when it ceases to so turn said mutilated gear-wheel M^2, and the shaft S^4, which operates the three sets of rolls, and then the latter stop in their rotation, to again revolve when the geared segment upon the mutilated gear-wheel M′ again commences to engage with the gears upon the wheel M^2. The periodic rotation of each of these pairs of rolls is controlled by the amount of peripheral engagement made between the mutilated gear-wheels M′ and M^2, and this geared engagement, as herein shown, to be arranged, gives to each pair of the said rolls a half-revolution with every periodic movement thereof. As shown in the accompanying drawings and as described herein, the periodic movements of these rolls occur simultaneously, and at each movement each pair of rolls commences to engage with what will be the entering end of a blank-length at the same time, and also ceases to engage (with what will be the other end of the latter when cut off) at the same instant. The creasing-rolls are keyed to their respective shafts, so as to bring each set of the creasing-blades in proper position to locate the nail-creases within each blank-length being operated upon at each periodic movement of the rolls and bar, and the rough-punching rolls are so keyed to their respective shafts as to commence the engagement with each blank-length of the bar at the point where the creasing-rolls ceased to engage with it, so as to properly locate the rough punchings within the previously-cut nail-creases. A bar of heated iron being entered between the shaping or entering rolls, so that its position therein will insure the action of the latter upon it to the full extent of a blank-length, said bar is then moved a blank-length by the primary set of rolls when the latter cease to turn, and as the rolls are again moved by the mutilated gears M′ and M^2 a succeeding and connected blank-length is operated upon by the entering or shaping rolls, while the blank-length first operated upon has reached the creasing-rolls, where it is creased for the nail-holes. When the rolls start again to move, the blank-length first operated upon has advanced to the rough-punching rolls, where it is rough-punched, while the entering or shaping rolls and the creasing-rolls are operating upon succeeding blank-lengths. After the bar has passed beyond the rough-punching rolls, it is full-punched, from whence it passes to the swaging mechanism, where it is cut off and swaged into shape as each succeeding blank-length of the bar follows it to be treated in the same manner.

The full-punching mechanism, the cutting mechanism, and the swaging and bending mechanism herein shown being the same as are shown in my before-named application, and not being claimed herein specifically, they are not described in detail.

While I have shown the mutilated gears M′ and M^2 as applied to communicate regular periods of motion and alternating periods of rest to the shaft which operates the rolls, and as the operation of these rolls as constructed and arranged would be the same if the shaft so moving them intermittently were so operated by other mechanism than said mutilated gears, I do not limit my invention to the use of the latter to so operate the shaft which moves them.

As the mutilated gears when used would perform the same function whether operated in connection with the promoter-arm of the one and the cam-arm of the other, I do not limit my invention so far as the application of the mutilated gears is concerned to their combination with the auxiliary factors consisting of the promoter-arm and cam-arm.

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

1. In a machine for making horseshoes, the combination of two rolls connected by gears to move together, one of said rolls being constructed with a groove made in its perimetral face to encircle the roll, a beveled gear-wheel on the shaft of one of the said rolls, a shaft provided with bearings and receiving intermittent motion from a mutilated gear arranged thereon, said shaft being constructed also with a beveled gear-wheel arranged to mesh into the beveled gear-wheel upon said roll-shaft, substantially in the manner as and for the purposes set forth.

2. In a machine for making horseshoes, the combination of two rolls connected by gears to move together, one of said rolls being constructed with a groove in its perimetral face to encircle the roll, two sets of creasing-blades outwardly projected from the bottom of said groove, a beveled gear-wheel on one of said roll-shafts, a shaft provided with bearings and having thereon a mutilated gear-wheel adapted to intermittingly rotate said last-named shaft, and a beveled gear-wheel on said mutilated gear-shaft, constructed to mesh into the beveled gear-wheel on one of said roll-shafts, substantially as and for the purposes set forth.

3. In a machine for making horseshoes, the combination of two rolls connected by gears to turn together, one of said rolls being constructed with a groove in its perimetral face encircling the roll, two sets of punches radially arranged in said groove, sinks made in the perimetral face of the other roll, adapted to

come radially coincident with the punches formed in the groove of the other roll as the rolls turn, a beveled gear-wheel upon the shaft of one of said rolls, a shaft provided with bearings and having a mutilated gear-wheel for receiving intermittent rotation, and a beveled gear-wheel on said last-named shaft, constructed to mesh into the beveled gear-wheel upon one of said roll-shafts, substantially in the manner as and for the purposes set forth.

4. In a machine for making horseshoes, the combination of the rolls E, N, and I, constructed with a beveled gear upon the lower roll-shaft of each set of rolls, the shaft S^4, provided with bearings and having beveled gear-wheels thereon, each of which latter is constructed to mesh into one of the beveled gears upon the shafts of said lower rolls, the mutilated gear-wheel M^2, arranged upon said shaft S^4, and the shaft S^3, constructed with the gear-wheel M′, arranged to intermittently engage with said mutilated gear-wheel M^2, substantially in the manner as and for the purposes set forth.

5. In a machine for making horseshoes, the combination of the rolls E, N, and I, constructed with a beveled gear-wheel upon each of the lower roll-shafts, the shaft S^4, provided with bearings and having thereon beveled gear-wheels, one of each of which is adapted to mesh into one of the beveled gear-wheels upon each of the lower roll-shafts, the mutilated gear-wheel M^2, provided with the promoter-arm A^2, arranged on said shaft S^4, and the gear-wheel M′, constructed with the promoter-arm A′ and arranged on the shaft S^3, substantially as and for the purposes set forth.

Signed at New York this 20th day of January, 1888, and in the presence of the two witnesses whose names are hereto written.

JAMES A. BURDEN.

Witnesses:
S. B. GOODALE,
E. D. GRANT.