No. 619,955. Patented Feb. 21, 1899.

S. H. HARRINGTON.

DRILLING MACHINE.

(Application filed Apr. 5, 1897.)

(No Model.) 3 Sheets—Sheet 1.

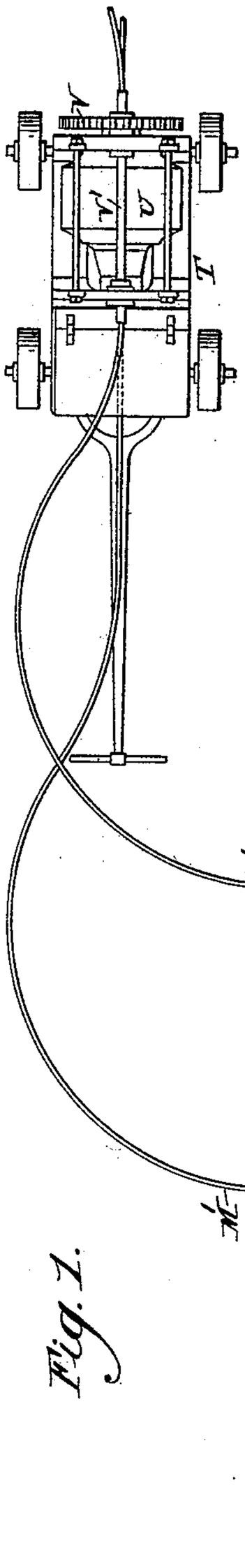

Fig. 1.

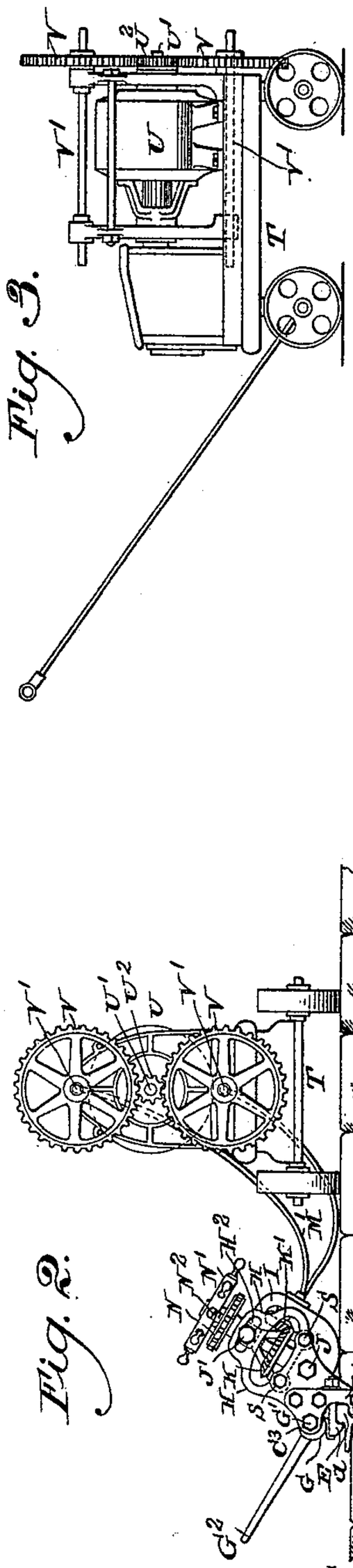

Fig. 3.

Fig. 2.

Witnesses.

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Fig. 5.

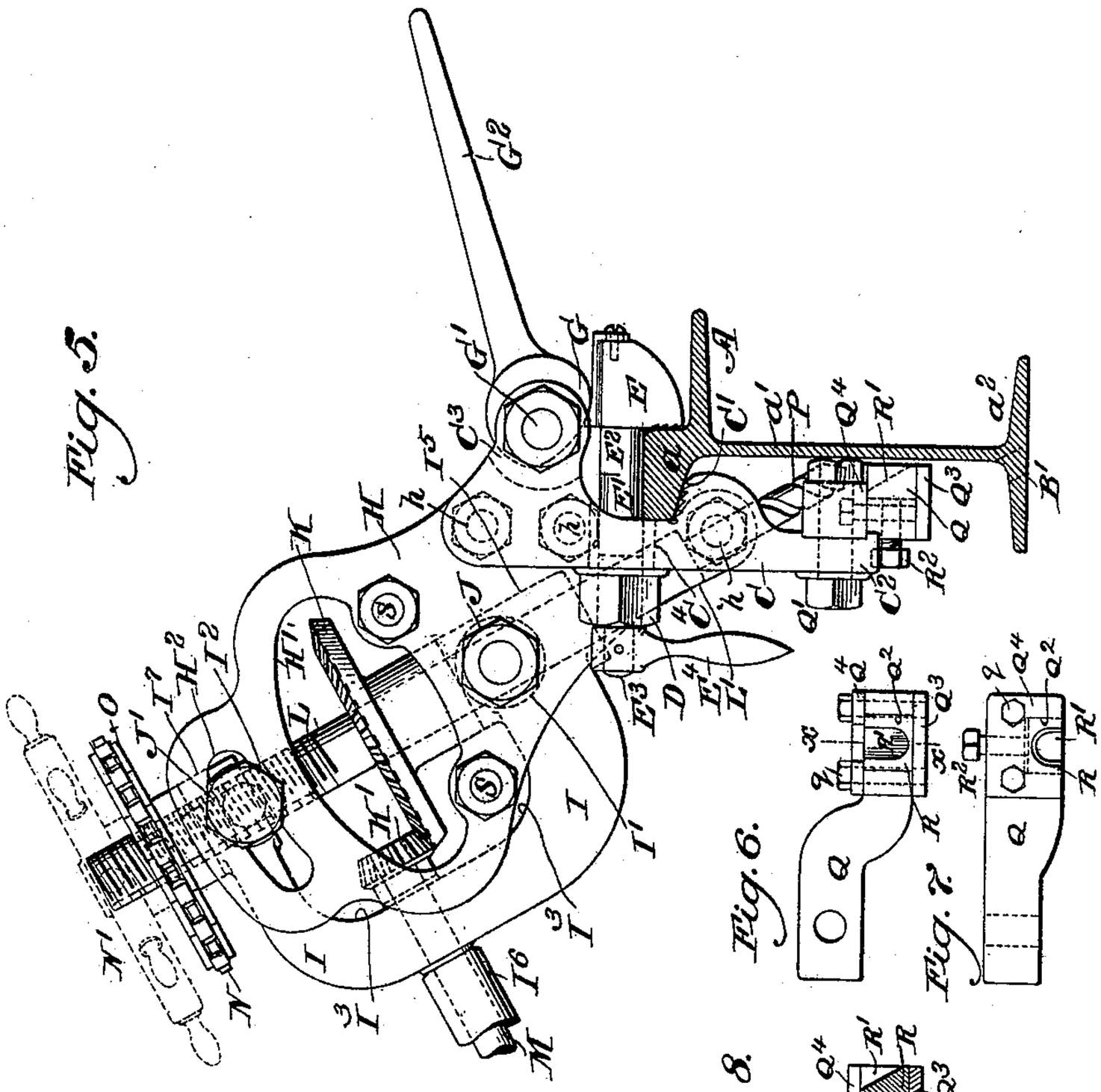


Fig. 6.

Fig. 7.

Fig. 8.

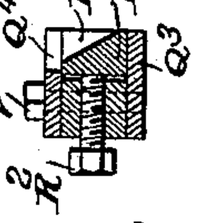
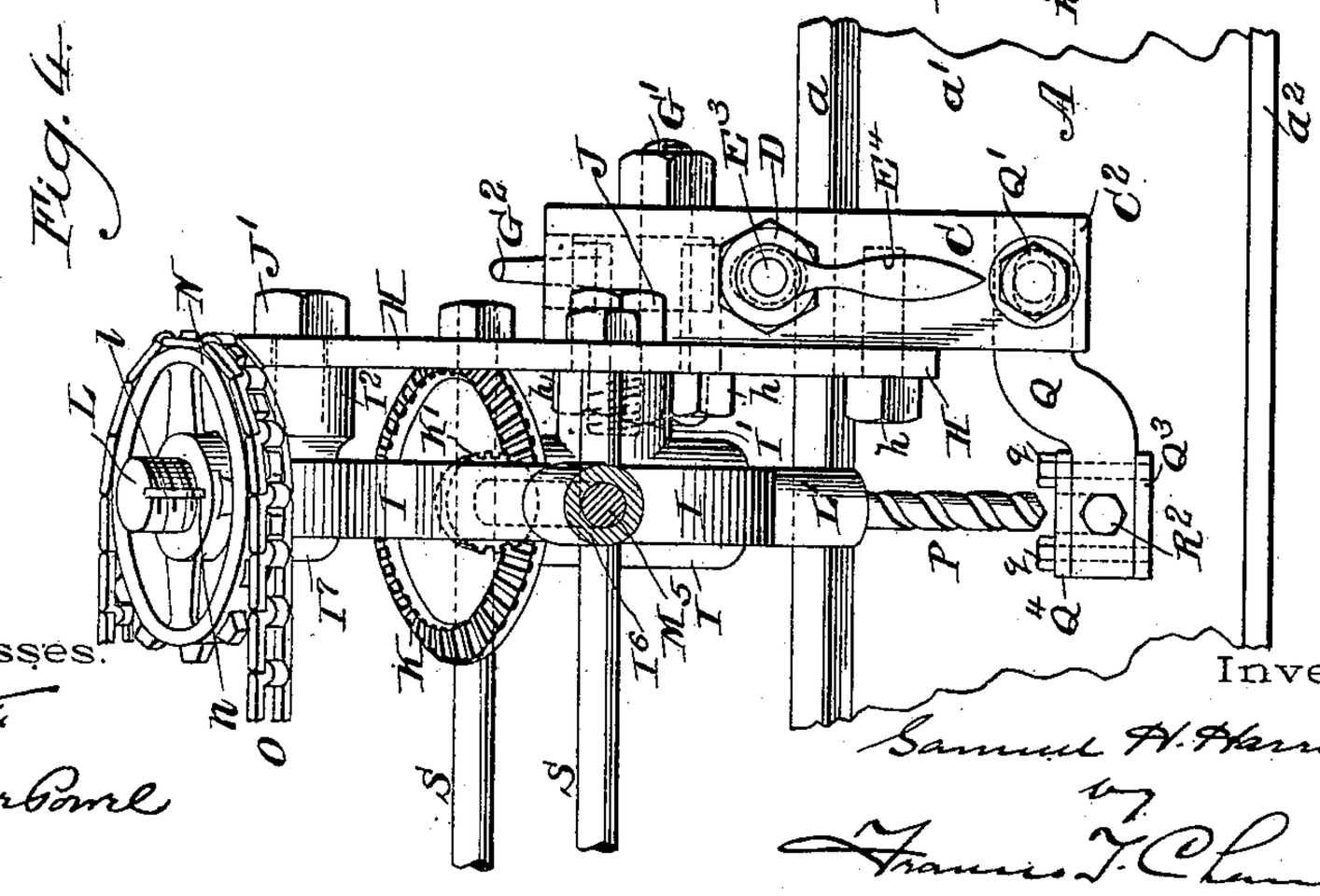


Fig. 4.



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DRILLING MACHINE.

(Application filed Apr. 5, 1897.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 9.

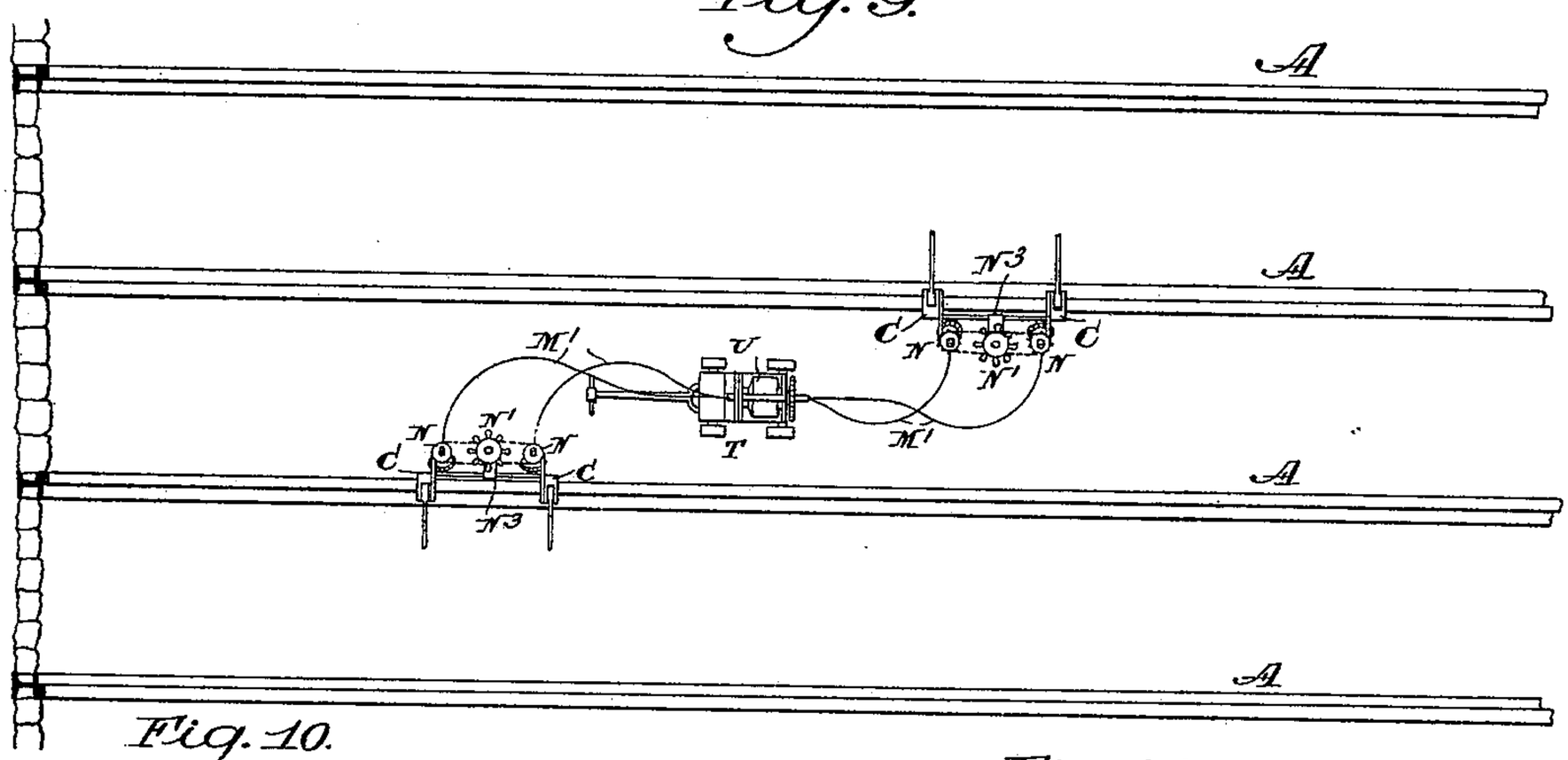


Fig. 10.

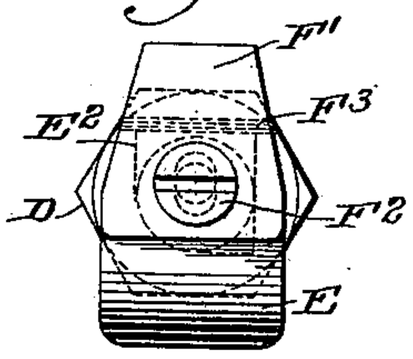


Fig. 11.

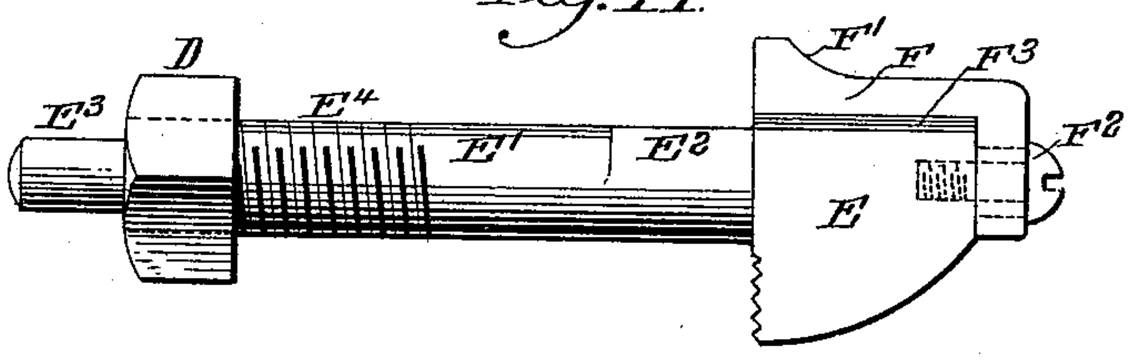


Fig. 12.

Fig. 13.

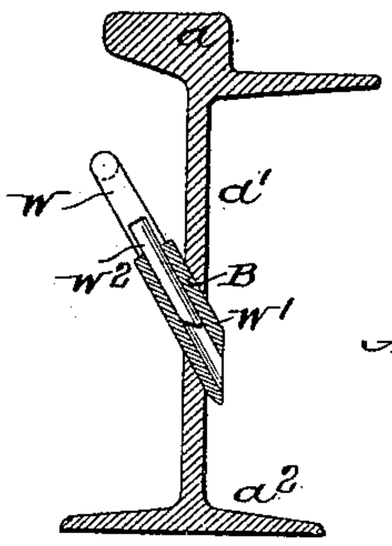
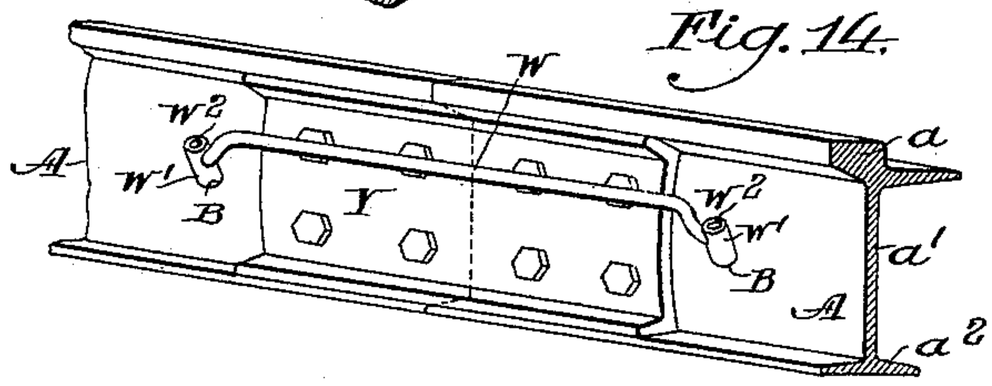


Fig. 14.



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UNITED STATES PATENT OFFICE.

SAMUEL H. HARRINGTON, OF NEW YORK, N. Y.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 619,955, dated February 21, 1899.

Application filed April 5, 1897. Serial No. 630,722. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. HARRINGTON, a citizen of the United States of America, residing in the city, county, and State of New York, have invented a certain new and useful Improvement in Drilling-Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of machines adapted to drill holes in metal plates, and has for its object to provide an apparatus which can be readily attached to and detached from the head of a rail or similarly-formed beam and which will also be adapted to drill holes at an acute angle to the web of the rail.

My invention is particularly adapted for use in drilling holes in railroad-rails already in place and for the purpose of providing a place and mode of attachment for electrical bonds, and I may here properly mention that the bonding of rails by means of bonds inserted in angularly-bored holes, such as my machine is adapted to make, is in itself the subject-matter of an application for Letters Patent filed December 10, 1896, Serial No. 615,085.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a plan view showing my drilling apparatus in its preferred and most improved construction in place upon a rail and connected with a portable electric motor. Fig. 2 is an end elevation of the same part shown in Fig. 1; Fig. 3, a side elevation of the portable electric motor; Fig. 4, an enlarged front view of my drilling-machine or of one of the independent machines coupled in Fig. 1. Fig. 5 is a side view of the same parts of the machine shown in Fig. 4. Fig. 6 is a front view of the drill-end-supporting device, a rear view of which is shown in Fig. 4. Fig. 7 is a plan view of the said device; Fig. 8, a cross-sectional view taken on the line $x\ x$ of Fig. 6. Fig. 9 is a plan view showing two of my perfected drilling apparatus coupled with a single portable motor. Fig. 10 is a front view of the movable clamp forming a part of my apparatus. Fig. 11 is a side elevation of the same; Fig. 12, a perspective view of the end of the clamp. Fig. 13 is a sectional view through a rail, showing the way in which the electrical bond can be inserted in the holes drilled by my apparatus; and Fig. 14 is a perspective of two adjacent rails drilled by my apparatus and bonded together.

A indicates a railway-rail which is shown as of the form commonly used in electric roads, although it will be understood that my apparatus is, with obvious modifications, adapted for use with any rail.

a indicates the head of the rail, a' the web of the rail, and a^2 the base of the rail.

B (see Figs. 13 and 14) indicates the angularly-drilled hole which my apparatus is intended to make and which hole may be either in the web of the rail, as shown in the said figures, or at the junction of the web with the base, as indicated at B′, Fig. 5.

In the construction shown the frame of the drilling apparatus is made up of a heavy plate C, to which is securely attached, by means of bolts $h\ h\ h$, a plate H, while the said plate H is rotatably connected with what I may call the "supplemental adjustable frame" I, which in its turn supports the movable mechanism acting directly upon the drill. It will be understood, however, that this particular construction is not of the essence of my invention, except with regard to such claims as specifically refer to the combination and coaction of these parts together, and the first and leading feature of my device is the means of clamping the frame, however constructed, to the rail. This object I effect by providing the plate C with the jaw C′, which may be conveniently formed from a part of the plate and which is adapted to pass beneath and engage with the lower portion of the rail-head a, as best indicated in Fig. 5, and in coaction with the said jaw C′, I provide a jaw, as E, which must be separable from the plate C, though connected therewith and so placed and shaped as to engage the upper portion of the rail-head, as is also indicated in Fig. 1. Preferably I provide a hole or perforation C^4 in the plate C and form or attach the clamping-jaw E to the end of a rod E′, which passes through the hole C^4 and is held upon the face thereof by any convenient means, preferably by a nut D, screwing on the threaded

portion E^4 of the rod E′. I prefer to make the rod E′ with the thread, as indicated, and to use the nut D for securing it to the plate C, because in this way the distance to which the clamping-jaw E shall extend beyond the face of the plate can be easily regulated and the said jaw adapted to engage with rail-heads of different proportions. Preferably also I make the rod E′ rotatable in the perforation of the plate C, so that the clamping-jaw E, which extends out to one side of the rod E′, as shown, can be turned through an angle of ninety degrees, the said jaw being turned up horizontally when it is desired to pass it over or withdraw it from the originally vertical position when it is desired to engage it with the rail-head, as shown in Fig. 5. A handle E^4, attached to the end E^3 of the rod E′, is a convenient means for turning the rod and jaw to the positions mentioned, and it is advisable to form the rod E′ where it connects with the head E with a rounded under face and square shoulders, as indicated at E^2, upon its upper face, so as to assist in turning it and holding it in proper position in passing over the rail-head.

It is obviously desirable that while in use the jaws E and C′ should be pressed toward each other or at least held in fixed relation to each other. The jaw E should also, without being brought to or removed from position on the rail, be loosely connected with plate C and in such manner that it will pass readily over the rail. For this purpose I make the hole C^4 considerably larger than the portion of the rod E′ which passes through it, so as to give the said rod considerable freedom of motion, and I provide upon the upper portion of the plate C, preferably upon an arm C^3 thereof, a clamping device which can be brought into operation after the clamp E is turned down to engage the rail-head and which will press the said clamp downward and, acting through the plate C, draw the clamp C′ upward. A convenient clamp for this purpose is a pivoted cam, such as is indicated at G, said cam being pivoted to the arm C^3 at G′ and provided with a lever-arm G^2, by which it can be drawn into and out of operation both with great force and great quickness of action, and to insure that this clamp shall act to the best advantage I preferably attach to the end of the clamp E an adjustable shoe F, which by means of a screw F^2 can be attached to the end of the clamping-jaw E, said screw passing through a slot in a downwardly-turned end of the shoe F and said shoe having preferably the curved face (indicated at F′) for the proper engagement of the clamping-cam G.

F^3 indicates shims which are placed between the shoe F and the top of the clamp E and by means of which the shoe is raised or lowered to the proper position for the best engagement with the cam-clamp. Of course any convenient means for adjusting the shoe upon the top of the clamping-jaw E may be used; but I have found that shims such as indicated are at once simple and thoroughly well adapted for the use.

In drilling oblique holes it is, I have found, important to provide a support for the drill end which will lie as near as possible to the point where the drill operates upon the metal, and in the construction shown I attach a drill-end support to a downwardly-extending arm C^2 of the plate C. Such support, as shown, consists of an arm Q, attached to the arm C^2 of the plate C by a bolt Q′ and having at its outer end, which lies close to the work, a recess Q^2. Plates Q^3 and Q^4 are secured, as by bolts *q*, above and below this recess Q^2, the upper plate Q^4 being recessed for the passage of the drill, and upon the lower plate Q^3, I place a grooved block R R′, indicating the groove and being of a size corresponding to the curvature of the drill, and I make this block adjustable, as by means of a set-screw R^2. It will readily be understood that by the proper adjustment of the block R the end of the drill will be amply supported in the closest proximity to the rail-web.

The plate H, as shown, is securely bolted to the plate C, as already described, and is formed with a slot H^2 and an opening H′, the said last-mentioned opening being to give clearance to the miter-wheel which rotates the drill-socket arbor, the lower end of which is indicated at L′, and the slot H^2 serving to permit the desired adjustment of the supplemental drill-holding frame which I prefer to use.

I is the supplemental drill-holding frame referred to, which is pivotally secured to the plate H, as shown, by means of an internally-threaded stud I′ and a bolt J, which passes through the plate H and into said internally-threaded stud I′. The frame I is formed to afford a bearing I^5 for the drill-socket arbor, and above the stud I′ the frame I is continued in the U-shaped form indicated, the portion corresponding to the base of the U affording a bearing for a shaft M, to which the actuating-pinion or bevel-wheel K′ is attached, while the upper arm of the U-shaped frame affords a threaded bearing to the drill-feed rod L, the upper portion of which is threaded to engage with said threaded bearing. To the upper arm of the U-shaped portion of the frame I is also connected a stud I^2, internally threaded and registering with the slot H^2 in the plate H. A clamping-bolt J′, passing through the slot H^2 and into the threaded stud I^2, serves to clamp the said stud against the plate H, and obviously by loosening the binding screw or bolt J′ the frame I may be turned on its pivot-stud I′ through any angle permitted by the length of the slot H^2.

K is a bevel-wheel engaged with the driving-wheel K′ and also engaged with the drill-socket arbor, so as to rotate the same and at the same time not interfere with its longitudinal movement, which is regulated by the feed-rod L. The longitudinal movement of the said rod L necessary to the proper feed

of the drill, which is shown at P, is effected in any convenient way, preferably by a thread formed on the rod L and engaged with a threaded bearing I^7 of the frame. For the rapid and convenient retraction or adjustment of the drill I provide a handle by which the rod L can be rotated in either direction at will; but I propose in general to couple two of the drilling devices described together, which can be conveniently done, as shown, by means of bracing and spacing rods S S, and I preferably place a sprocket-wheel N on the top of each of the drill-holding rods, which are formed with longitudinal slots *l* (see Figs. 4 and 5) and engaged by a spline *n* in the hub of wheel N, and I connect the wheels N together by means of a sprocket-chain O. A hand-wheel N′, secured to a shaft supported as on a block N^3, but having attached to its shaft a sprocket-wheel N^2, will enable the operator, by turning the said wheel N′, to simultaneously withdraw or adjust the drill-holding rods of both connected devices. It will be understood that by connecting the two drills together by rods S, I am enabled to drill two holes at the same time in the adjoining ends of two rails and to insure that the two holes shall be accurately spaced to permit the use thereof of a bond of given length and form, such as is indicated at W, Figs. 13 and 14, said bond having enlarged ends W′, which enter the angular hole B B, and being secured therein by any convenient means—as, for instance, by the action of a wedge-pin W^2.

T indicates the portable motor, the motor itself being shown at U, U′ being its shaft, to which is attached a pinion U^2, which in turn gears with spur-wheels V V, by which the shafts V′ V′, situated on opposite sides of the motor, are rotated. To these shafts I attach flexible shafting, as indicated at M′ M′, and of course these flexible shafts are coupled in turn with the shafts M, by which power and motion are communicated, as described, to the drill-rods. A single motor can be conveniently used, as indicated in Fig. 9, to simultaneously actuate four drills.

A markedly advantageous feature of my apparatus is that it permits the bonding or rebonding of rails in place with very little disturbance of the adjacent parts of the street-paving, and where used in connection with an operating trolley-road the electric motor is the most convenient device to use for actuating the drills, as the said motor can be connected with the trolley-wire and ample power instantly provided for the rapid and efficient action of the drills.

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

1. In a machine for drilling holes in railway-rails, the combination with the drill-supporting frame of a clamping-jaw C′ adapted to engage the under side of the rail-head, a rod E′ connected to the frame above jaw C′ so as to be rotatable therein and a clamping-jaw E extending out from one side of rod E′ substantially as specified and so as to engage and disengage the upper side of the rail by a rotative movement.

2. In a machine for drilling holes in railway-rails, the combination with the drill-supporting frame of a clamping-jaw C′ adapted to engage the under side of the rail-head, a rod E′ connected to the frame above jaw C′ so as to be rotatable therein, a clamping-jaw E extending out from one side of rod E′ substantially as specified and so as to engage and disengage the upper side of the rail by a rotative movement and a clamp as G secured to the frame above jaw E and adapted to press said jaw downward when brought into operation.

3. In a machine for drilling holes in railway-rails the combination with the drill-supporting frame of a jaw C′ adapted to engage the lower side of a rail-head, a threaded rod E′ passing through a hole in the frame, and rotatable therein, a clamping-jaw E extending out to one side of said rod and a nut D screwing on the threaded end of said rod and regulating the distance of the jaw E from the frame.

4. In a machine for drilling holes in railway-rails the combination with the drill-supporting frame of a jaw C′ adapted to engage the lower side of a rail-head, a threaded rod E′ passing through a hole in the frame and rotatable therein, a clamping-jaw E extending out to one side of said rod, an adjustable clamp-shoe F secured to the top of jaw E and a cam-clamp G pivoted on the frame and arranged to act on shoe F as described.

5. In a machine for drilling holes in railway-rails the combination with the drill-supporting frame of a jaw C′ adapted to engage the lower side of a rail-head, a threaded rod E′ passing through a hole in the frame, and rotatable therein, a clamping-jaw E extending out to one side of said rod, a nut D screwing on the threaded end of said rod and regulating the distance of the jaw E from the frame, an adjustable clamp-shoe F secured to the top of jaw E and a cam-clamp G pivoted on the frame and arranged to act on shoe F as described.

6. In a machine for drilling holes in railway-rails the combination with the drill-supporting frame arranged to support a drill at an acute angle to the rail-web of clamping-jaws adapted to secure said frame to the head of a rail and a drill-end support secured to the frame and arranged to lie beneath the drill and to come in close proximity to the point on the rail-web upon which the drill operates.

7. In a machine for drilling holes in railway-rails the combination with the drill-supporting frame arranged to support a drill at an acute angle to the rail-web of clamping-jaws adapted to secure said frame to the head of a rail and an adjustable drill-end support se-

cured to the frame and arranged to lie beneath the drill and to come in close proximity to the point on the rail-web upon which the drill operates.

8. In a machine for drilling holes in railway-rails the combination of two drill-supporting frames each having clamping-jaws for securing them to a rail-head with spacing and bracing irons whereby said frames are held in proper position to drill holes in adjacent rail ends, threaded drill-actuating rods as L secured in each frame, sprocket-wheels as N secured to each rod, a sprocket-chain O coupling said wheels and an adjusting-handle as N^2 whereby said wheels N can be simultaneously operated to withdraw or advance the drills.

9. In combination with a machine for drilling holes in railway-rails consisting of two coupled drill-frames each having clamps to secure them to the rail-heads and independent drill-actuating mechanism, a portable electric motor coupled to two separate shafts V′ V′ and flexible shafting coupling each of said shafts to one of the drill-actuating devices.

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