No. 660,009. Patented Oct. 16, 1900.

W. J. EVANS.

DRILL FORGING AND SHARPENING MACHINE.

(Application filed Dec. 21, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 6.

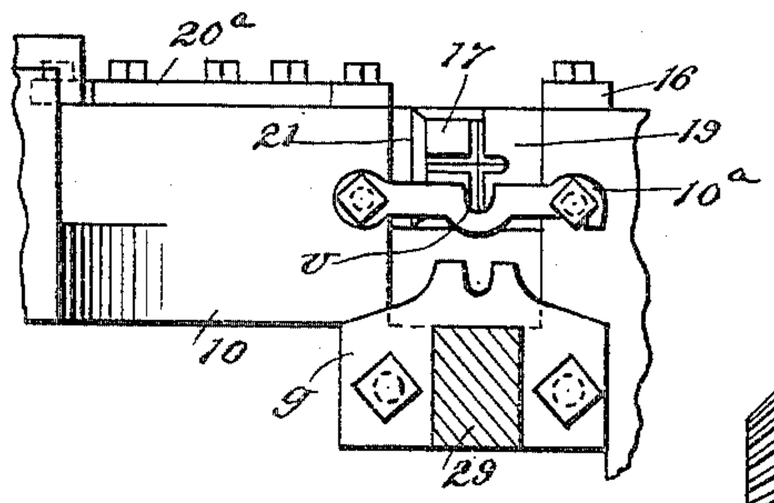


FIG. 1.

FIG. 2.

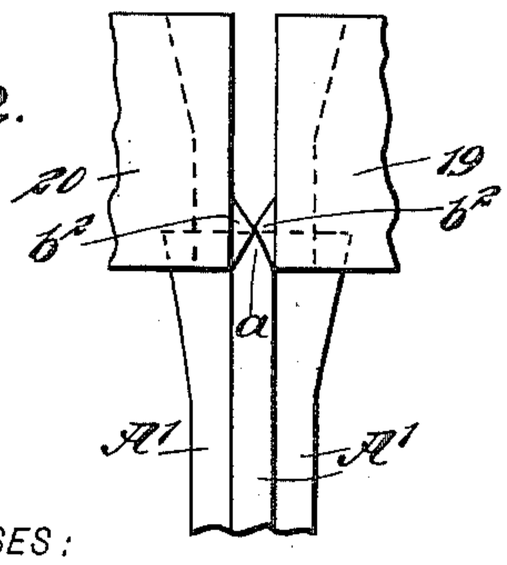
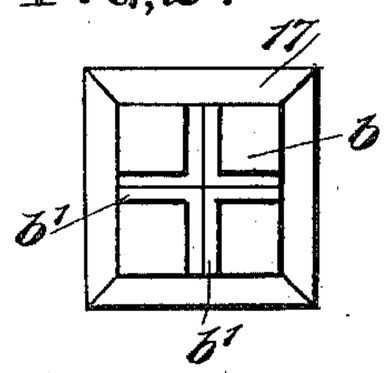


FIG. 2a.



WITNESSES:

Donn Turtchell

Wm. P. Patton

INVENTOR

William J. Evans

BY Munn & Co

ATTORNEYS

No. 660,009. Patented Oct. 16, 1900.

W. J. EVANS.

DRILL FORGING AND SHARPENING MACHINE.

(Application filed Dec. 21, 1899.)

(No Model.) 2 Sheets—Sheet 2.

FIG. 3.

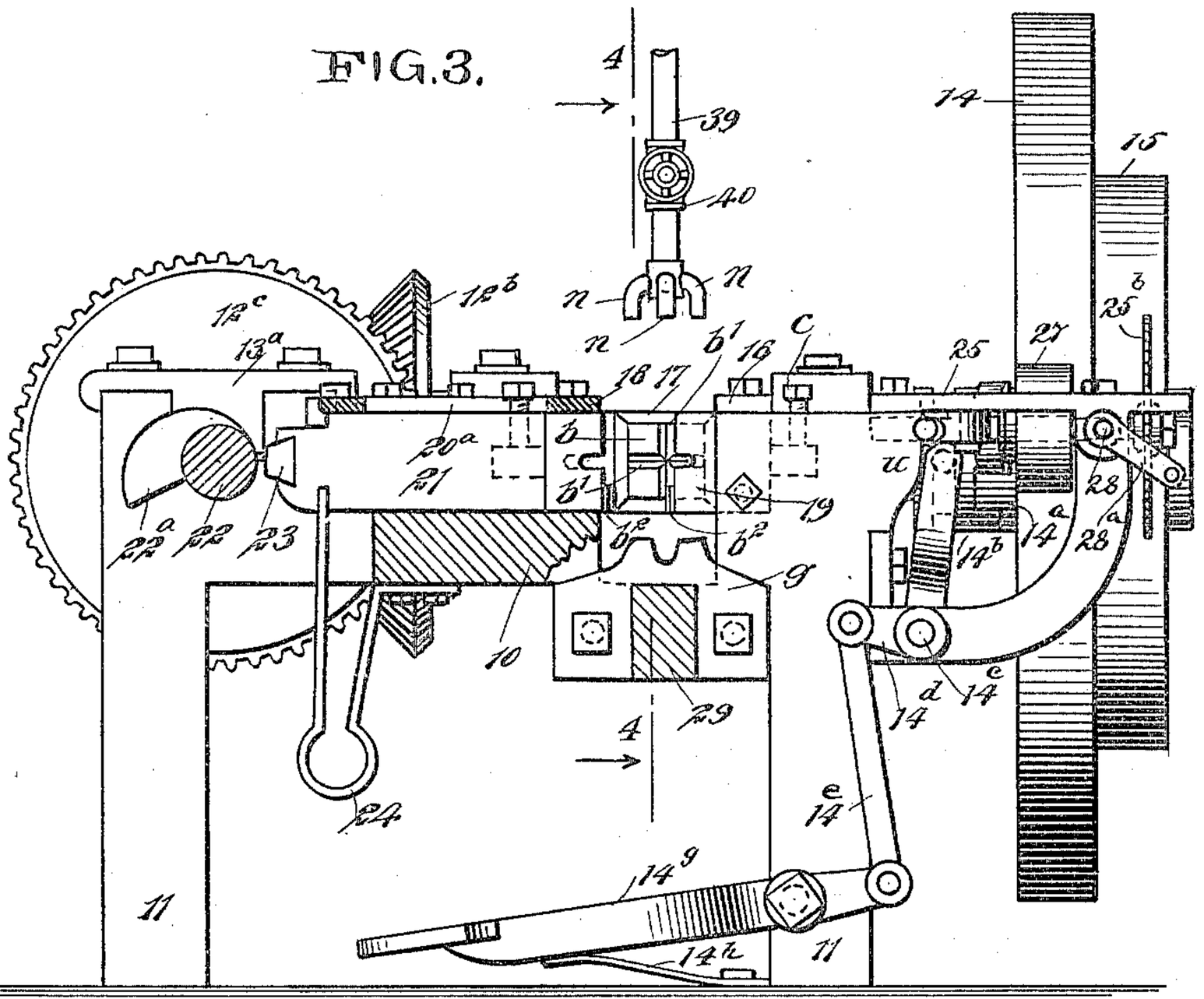


FIG. 4.

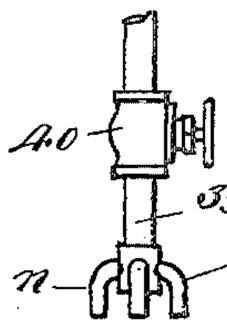


FIG. 5.

WITNESSES:

Donn Twitchell

Wm. L. Patton

INVENTOR

William J. Evans

BY

Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM J. EVANS, OF BUTTE, MONTANA.

DRILL FORGING AND SHARPENING MACHINE.

SPECIFICATION forming part of Letters Patent No. 660,009, dated October 16, 1900.

Application filed December 21, 1899. Serial No. 741,173. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. EVANS, a citizen of the United States, and a resident of Butte city, in the county of Silver Bow and State of Montana, have invented a new and Improved Drill Forging and Sharpening Machine, of which the following is a full, clear, and exact description.

This invention has for its object to provide additional improvements upon the drill forging and sharpening machine for which I filed an application for Letters Patent on March 7, 1899, Serial No. 708,115, and which was allowed on May 27, 1899, whereby said machine is rendered more simple, compact, and effective in operation and the cost of production is considerably reduced.

The invention consists in the construction and combination of parts, as is hereinafter described, and defined in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improved machine. Fig. 2 is an enlarged fragmentary plan view of two opposite dies employed. Fig. 2^a is an enlarged end view of an edge-forming die which coöperates with the other dies. Fig. 3 is a sectional view substantially on the line 3 3 in Fig. 1. Fig. 4 is a sectional view substantially on the line 4 4 in Fig. 3. Fig. 5 is a sectional view substantially on the line 5 5 in Fig. 4; and Fig. 6 is a front elevation of a portion of the machine, partly in section, showing a detail omitted in Fig. 3.

The rock-drill which this improved machine is designed to forge from new material or to renew the cutting edges of is of a well-known form and comprises a cylindric shank A, (shown in Fig. 1,) having four wings A′, which project oppositely in pairs, producing a cruciform shape in cross-section, these wings terminating in V-shaped cutting edges, as clearly indicated at *a* in Figs. 1 and 4.

To widen the cutting edges for the clearance of the drill, the wings A′ must be upset while hot at the end that is to be provided with cutting edges, and in order to hold the drill in position so that it may undergo the upsetting and edge-forming operation the improved construction hereinafter described is provided, which forms a feature of the invention.

To render the construction and operation of the new details clear and indicate their relative positions on the machine, the latter so far as it is well known will first be described.

A suitable frame or bed plate 10 is provided, having legs 11, that support it at a proper height, two legs being shown in Fig. 3; but usually four legs are required, which are positioned at the corners of the frame.

In the machine on which this is an improvement a main shaft 12 is supported to rotate above the bed-plate 10 by pedestal-boxes 13, and at one end of said shaft that projects laterally beyond the bed-plate a fast pulley and a loose pulley are positioned thereon, a balance-wheel being secured upon the opposite end of the shaft. As now constructed the transverse main shaft 12 is supported to rotate above the bed-plate 10 by the pedestal-boxes 13, as before, and at one end of said shaft which projects laterally beyond the bed-plate a friction-wheel 14, which is also a balance-wheel, and an attached pulley 15 are loosely mounted thereon, said pulley receiving motion from a belt. (Not shown.)

On the shaft 12, between one pedestal-box 13 and the hub of the friction-wheel 14, a clutch member 14^b is held to slide and rotate with said shaft by a spline *s*, said clutch member being adapted to interlock with a like member 14^a, formed or secured on the hub of the friction-wheel, and it will be seen that the splined clutch member is controlled by a fork-shaft 14^c, that is held to rock on the frame 10 at one side thereof by boxes *u*.

At the forward end of the fork-shaft 14^c a crank-arm 14^d is secured, and to the outer end of said arm the upper end of the link-bar 14^e is pivoted, the lower end of which is jointed upon one end of the treadle-lever 14^g, held to rock on the frame 10 and adapted to receive foot-pressure. Between two of the pedestal-boxes 13 an opening is formed in the bed-plate 10, and parallel guides 16 are located at the sides of the said opening, the guides being disposed at right angles to the axis of the shaft 12. A slide-block 17 is mounted to re-

ciprocate between the guides 16 and carries at its forward end a die *b*, which will be further described.

Opposite the slidable die-block 17 the shaft 12 is furnished with a double-crank formation 12ª, engaged loosely by the rear end of a pitman-rod 18, which is pivoted at the forward end in the notched rear end of the die-block 17, and it will be seen that a rotation of the shaft 12 will reciprocate the block 17 in the guides 16.

In the machine which the present improvements to be described are applied upon two spaced slidable die-blocks were positioned on the frame 10 in advance of the die-block 17 and held to reciprocate on guides similar to the guides 16, and said die-blocks were disposed in the same plane parallel with the shaft 12 and actuated by suitable bevel-gearing driven by said shaft, whereby the three die-blocks were reciprocated simultaneously for engagement with the wings of the drill operated upon by the machine. As here shown, one die-block 19 is held stationary in a suitable socket or recess, preferably at the right-hand side of the bed-plate 10, so that the working face of said die will be nearly in the same plane with a longitudinal center line drawn through the die-block 17, and the die-block 19 is secured in place by a set-screw *c*, whereby it is disposed as a fixture at right angles to the die-block 17.

At the sides of an opening in the bed-plate 10, forward of and at right angles to the guides 16, the parallel guides 20ª are secured, and a die-block 21 is held to slide thereon, so that the die held on the end of said block which is adjacent to the working face of the die-block 19 may be slid toward or from the latter.

A bevel-gear 12ᵇ is secured upon the shaft 12, adjacent to an intermediate pedestal-box 13, and meshes with a like gear 12ᶜ, affixed upon the rear end of the cam shaft 22, that is held in pedestal-boxes 13ª at right angles to the shaft 12.

A wear-block 23 is secured in the socketed end of the die-block 21, opposite the cam-swell 22ª, that is formed on the shaft 22, and a depending bow-spring 24, that is engaged at one of its ends with the die-block 21 and secured at the bent opposite end upon a portion of the frame 10, serves to press said die-block toward the cam-swell and slidably retracts the die-block when the cam-swell is moved into a reversed position, as shown in Fig. 3, and it is to be understood that the arrangement of the lateral die-blocks 19 and 21, whereby the latter-mentioned die-block is actuated by the cam-swell 22ª toward the fixed die-block 19 and retracted by the bow-spring 24, is a feature of the present improvements.

The dies that are end faces of the sliding block 21 and stationary block 19 have been shown in my allowed patent application and are therefore not specifically claimed as new in this connection; but as their construction should be explained to render their coöperation with novel details clear, it is as follows: There is a horizontal channel of proper depth formed across the center of each die-face, these channels being of a depth and width which adapts them to receive loosely two opposite wings A′ of a drill-body, and, as indicated by dotted lines in Figs. 1 and 2, at the inner portions of the die-channels they are widened gradually, thus forming a slope on the bottom wall of each die-channel, these opposite slopes being designed to define the widening of the drill-wings at and near their cutting edges that are formed across the free ends of the wings.

The edge-sharpening die *b*, held in the end of the slide-block 17, previously mentioned, has two channels *b*′, formed in its working face at the center thereof, these channels having V shape in cross-section and crossing each other at right angles, as best shown in Fig. 2ª.

From the working faces of the die 19 and the die 20, carried by the slide-block 21, project two substantially V-shaped swaging-dies b^2 b^2, which are employed to sharpen the edges of drills that have been blunted by use, and, as before stated, I do not in this application claim novelty for the specific construction of any one of the dies herein described.

It has been found quite essential in the manufacture of new drills or in repairing the broken edges of old ones to provide means for rapidly and truly cutting squarely across the cruciform body of the new drill or the like-shaped body of an old drill which needs resharpening if broken angularly. To this end I have furnished as an adjunct for the drill forging and sharpening machine a compact and simple sawing device comprising the following details:

Upon the frame 10 of the machine, preferably at the right-hand side thereof, a saw-supporting bed-piece 25 is secured, rotatably carrying a saw-mandrel 25ª in boxes *e e*, that are separated by a slot in said bed-piece. Upon the the outer end of the mandrel 25ª a small circular saw 25ᵇ, that is adapted to cut hot steel, is held by a clamp in the usual manner. The boxes *e e* are held to slide a limited degree on the bed-piece 25 toward and from the main shaft 12 and friction-wheel 14, before mentioned, this wheel having a true peripheral face and considerable diameter, which adapts it to project beyond the face of the attached pulley 15. Upon the mandrel 25ª a friction-wheel 27, of small diameter, is secured opposite the face of the friction-wheel 14, and an adjusting-screw 28 is provided, which by its threaded engagement with the nut-block *d*, fixed upon the bed-piece 25, will when rotated by manipulation of the handle 28ª press the wheel 27 toward the large wheel 14 to receive rapid motion therefrom for a corresponding rotation of the saw 25ᵇ when the main shaft 12 is rotated, which will adapt the saw for service in cutting off drill material or the like. The friction-wheel 27 has a

grooved hub *t*, engaged by the forked and pivoted lever 27ª, which by its movement will slide the friction-wheel 27 toward or from the wheel 14. The saw may be thrown into operation at any time while the wheel 14 is running by moving the small wheel 27 opposite to the face of the wheel 14 and then causing the wheel 27 to press upon the latter and receive motion therefrom by manipulation of the screw-handle 28ª.

Another feature of the improvements consists in the provision of simple and reliable means to support the body of a drill in a horizontal position and hold it from recession while it is operated upon to spread the forward portions of the wings thereof and sharpen the cutting edges at the ends of said wings, the construction of this support being essentially as follows: In front of the die-block 17 and spaced between the dies on the blocks 19 21 is positioned a guideway 29, one end thereof being affixed upon the bed-plate 10 and the outer end resting upon the legs 29ª, whereby the guideway is maintained in a horizontal plane. The guideway 29 is formed of a metal bar rectangular in cross-section and provided with flanges 29ᵇ, that extend a short distance above the upper surface of the body-bar 29, on which bar ratchet-teeth *f* are formed, that hook toward the frame or bed-plate 10. Upon the guideway 29 a rest-block 30 is mounted and held to slide, having an opening therein for the passage of the drill-body, said rest-block affording support to the drill-body in conjunction with a notched bracket-plate *g*, secured on the front edge of the bed-plate 10, as shown in Figs. 1, 3, and 4. A slidable carriage 31 is mounted upon the guideway 29 and adapted for retention at any point of sliding adjustment by the locking-pins 32, that may be inserted through alined transverse apertures in the depending flanges of the carriage and in the body of the guideway, a series of spaced perforations *h* being formed in the guideway, as shown in Figs. 1 and 4, to receive one or more of the pins. A pawl 33 is pivoted between the sides of the carriage 31 and projects toward the outer end of the guideway 29, the toe of said pawl having engagement with any one of the ratchet-teeth *f* to which it may be adjacent, the pawl serving to brace the forward portion of the carriage 31 against shocks it sustains in service, as will presently be explained. The opposite parallel flanges on the adjustable carriage 31 are projected down near their rear edges to form a support 31ᶜ for the cam-lever 34, the cam-head *i* of which is pivoted between said flanges, as indicated in Figs. 4 and 5. The convex face of the cam-head *i* is furnished with sharpened transverse teeth *i'*, which normally engage with the lower side of the guideway 29, this contact being enforced by a weight *m*, formed or fixed upon the lowermost end of the lever 34. Between the parallel side walls of the carriage 31 a cam-head 35 is supported to rock by a cross-shaft 36, whereon said head is secured, and upon one outwardly-projecting end of the cross-shaft 36 a duplex-lever device 37 is secured, the two levers thereof being spaced apart by a brace 38, as shown in Figs. 1 and 4.

A water-spraying device for cooling the dies is located above them, this device consisting of a plurality of jet-tubes *n* on a pipe 39, controlled by a valve 40 and receiving water under pressure from any suitable source, and below the dies an aperture *o* is formed in the bed-plate 10 for the escape of water and also the removal of scales of metal that may fall from the hot drills while operated upon.

When a drill is to be upset and the cutting edges formed or renewed upon the wings A' thereof, the hot drill is placed in position so that two opposite wings A' thereof will enter the channels in the lateral dies 19 21 and a lower wing of the drill-body may rest in the notch *v*, formed in the upper edge of the rest-bar 10ª, pivoted by one end on the front edge of the frame 10 below the opening between the dies 19 and 21.

The guideway 29 (shown broken away intermediately of its ends) should be of a suitable length to accommodate a long drill, which may have its body or shank near the forward end supported by the rest-block 30, while the forward end of the drill-shank abuts against the convex face of the cam-head 35.

The operation of the machine is controlled by the foot of the operator engaging the treadle-lever 14ᵍ, which is shown depressed in Fig. 3, but is normally elevated by the spring 14ʰ, so as to disconnect the clutch-heads 14ª 14ᵇ.

The carriage 31, in case the impact of the block 17 upon the end of the drill is light, may be held against yielding movement by the pawl 33 and cam-head *i* on the weighted lever 34; but if a number of drills which are to be operated upon require heavy blows of the sharpening-die *b* in the block 17 to renew their cutting edges then the locking-pins 32 may be employed, which will secure the carriage 31 against percussive blows and hold it stationary.

When the hot drill-wings are in position to receive the strokes of the dies on the slidable blocks 17 and 21, the end thrust of the die-block 17 may be counteracted by the manipulation of the lever device 37, whereby the cam-head 35 may be caused to press the free ends of the wings on the drill-body toward the die *b* in the block 17 for completing the sharpening of the cutting edges of the drill.

It is claimed for this machine as now improved that it will afford means to rapidly and perfectly sharpen the cutting edges of new or old rock-drills and facilitate the removal of broken ends of drills that are to be sharpened.

It will be evident that by an obvious change in the form of the dies employed the machine

may without other alteration be employed to form heads upon long or short bolts, railroad-spikes, and like work.

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

1. In a drill forging and sharpening machine, the combination with a supported shaft having a double crank intermediate of its ends, a slidably-supported edge-forming die, and a pitman connecting this slidable die with the double crank, of a stationary channeled die held at a right angle to the edge-forming die, an opposite channeled die slidably held in the same plane with the fixed channeled die, a wear-block secured on the rear end of the slidable channeled die, a cam fast on a rotatable shaft and adapted to press upon the wear-block, and a bow-spring, one end of which is secured on the support of the channeled dies, and the other end engaging the slidable channeled die for its retraction.

2. In a drill forging and sharpening machine, the combination with a plurality of dies adapted to upset and sharpen the cutting edges of a four-winged drill, of a drill-supporting device comprising a horizontal guideway, a carriage movable on the guideway, means to hold the carriage at different points on the guideway, a cam-head held to rock on a pivot-shaft between uprights on the carriage, and handle-arms on the pivot-shaft of the cam-head adapted by manipulation to rock the cam toward an end of a drill-shank to feed it up against the impact of the edge-sharpening die.

3. In a drill forging and sharpening machine, a drill-supporting device, comprising a supported guideway having a series of ratchet-teeth on its upper side, a carriage mounted to travel on the guideway, a pawl on the carriage engaging the ratchet-teeth, a weighted lever pivoted upon the carriage and having a serrated cam-head which normally contacts with the guideway, a cam-head supported to rock on the carriage for engagement with the end of a drill, and means to rock said cam toward and from the drill.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM J. EVANS.

Witnesses:
WILLIAM T. HOAR,
ED. LONG.