2 Sheets—Sheet 1

M. L. EDWARDS.

Metal Drilling-Machines.

No. 195,993. Patented Oct. 9, 1877.

Fig. 1.

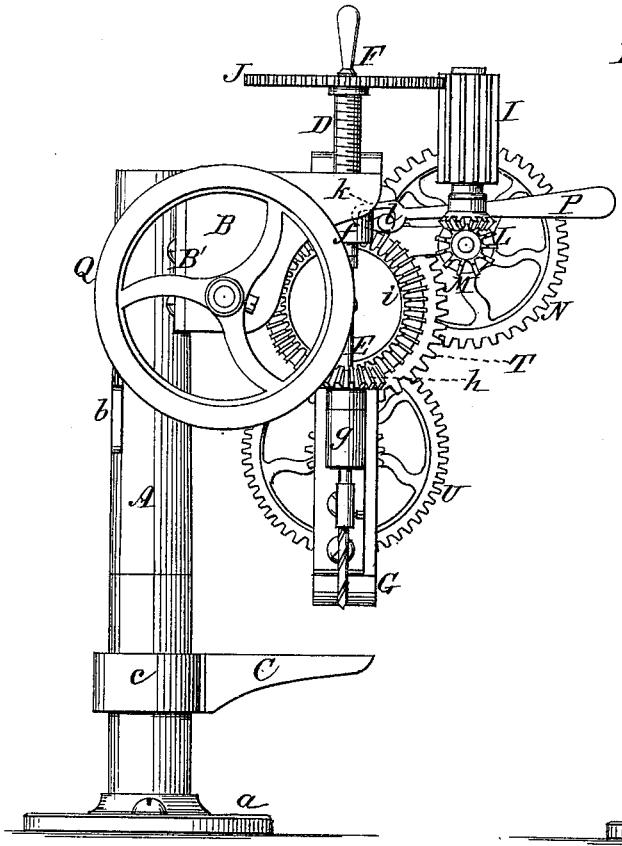


Fig. 2.

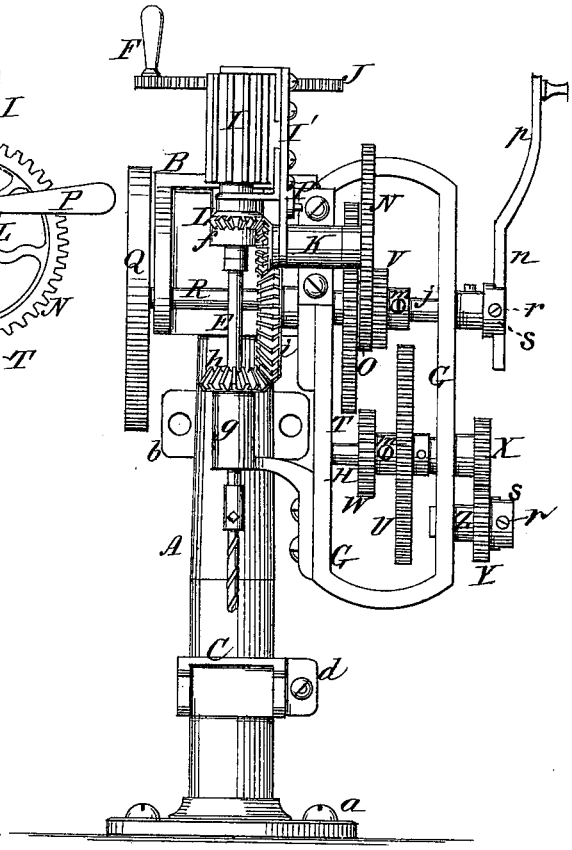
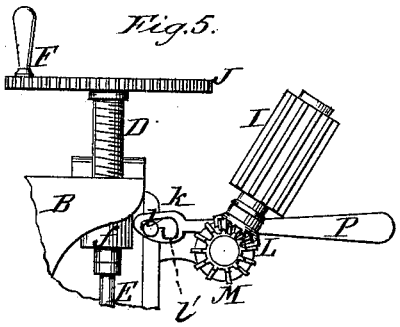


Fig. 5.



Witnesses;
Floyd Norris
D. P. Cowl

Martin L. Edwards
Inventor,
by Johnson & Johnson
Attys

2 Sheets—Sheet 2.

M. L. EDWARDS.

Metal Drilling-Machines.

No. 195,993. **Patented Oct. 9, 1877.**

Fig. 3.

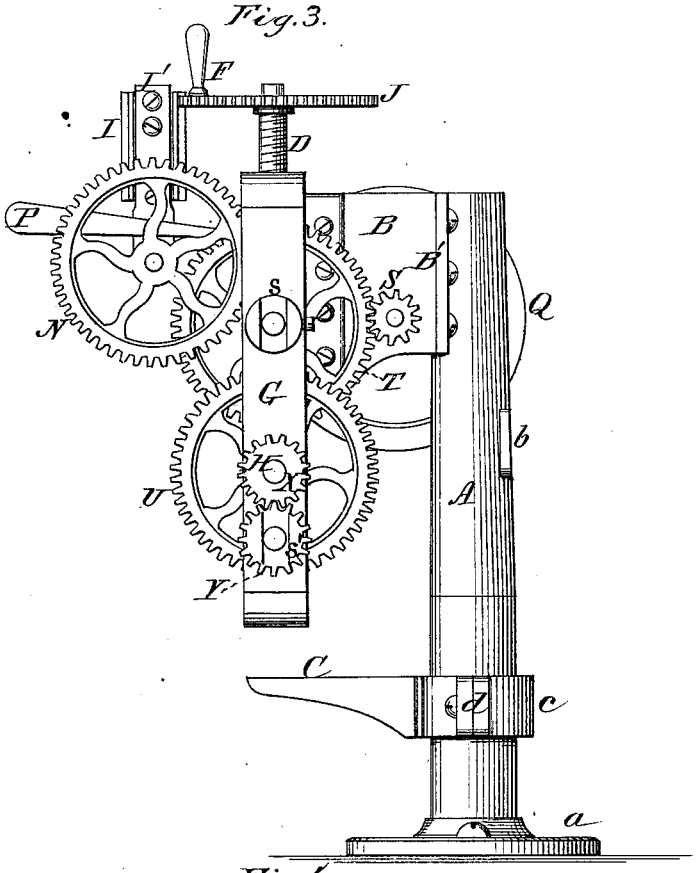
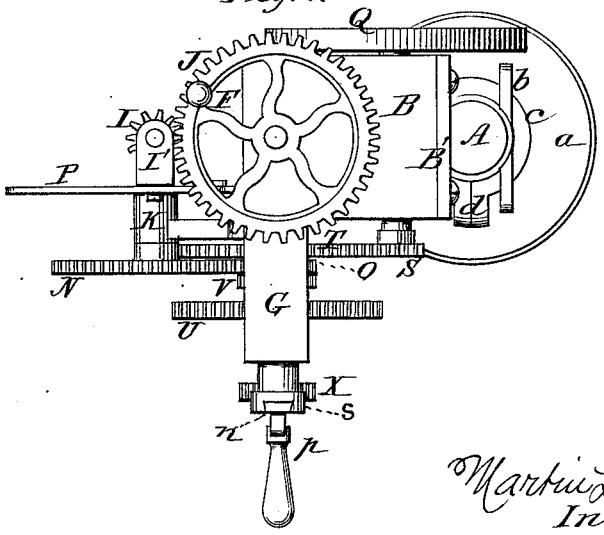


Fig. 4.



Witnesses,
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UNITED STATES PATENT OFFICE.

MARTIN L. EDWARDS, OF SALEM, OHIO.

IMPROVEMENT IN METAL-DRILLING MACHINES.

Specification forming part of Letters Patent No. **195,993**, dated October 9, 1877; application filed May 26, 1877.

To all whom it may concern:

Be it known that I, MARTIN L. EDWARDS, of Salem, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Metal-Drilling Machines, which improvements are fully set forth in the following specification and accompanying drawings.

My improvements are designed with special reference to upright drills for drilling metal, my object being to produce a machine adapted to all classes of work, and to render it unnecessary to manufacture but one size machine, and supply all the wants of metal-worker using a hand-drill.

The operating parts of the drill are carried by an overhanging head mounted upon a fixed column. A supplemental frame depending from the head supports the bearings for the driving-shafts and the gearing by which to change the speed of the drill-spindle. A feed device of novel construction and adaptation effects a continuous feed of the drill-spindle, and its relation to the latter and the connecting-gear of the main shaft is such as to give the operator control of the feed by the simple adaptation of a long pinion, so as to engage with a hand-wheel gear of the spindle, and to be swung out therefrom to stop the feed, such adjustment and the holding of the long pinion in gear being effected by a lock catch-lever, or equivalent device.

The driving-power may be applied to either of the shafts of the supplemental frame, and any desired motion obtained.

A fly-wheel is arranged and adapted to have a much faster motion at all times than that of the drill-spindle, which gives an important advantage in the working of the machine.

Referring to the drawings, Figure 1 represents a side elevation of a drilling-machine embracing my invention; Fig. 2, a front elevation; Fig. 3, the gearing side of the machine, and Fig. 4 a top view of the same. Fig. 5 is a view showing the long pinion locked out of gear.

In the construction of the upright drill, I employ a cylindrical column, A, which may be solid or hollow, and is provided with a base bearing, *a*, for attachment to a bench, or a side bearing, *b*, for attachment to a post or the wall, as may be desired, and a head, B, for supporting the working parts of the drill.

The head is bolted to a vertical flange, B′, at the top of the post, and the side bearing is secured to the rear side of the column.

A table, C, capable of horizontal and vertical adjustment upon the lower portion of the column, supports the work to be drilled, and it is secured to said column by a clamping-eye, *c*, split at one side, and with a clamp-screw passing through eye-extensions *d*, by which said table is clamped to any position desired, with respect to the bit and the character of the work. The lower portion of this column is made a true cylinder, to allow the clamping-eye to be moved up and down, and the table to be turned to either side and swung out to remove or place the work thereon.

The feed-screw D of the drill-spindle E is provided with a left-hand thread, and passes through a screw-threaded boss, *f*, projecting down from the head, a hand feed-wheel, F, being secured to the upper end of the feed-screw, and the lower end of the spindle is provided with the usual socket for the bit.

A bracket, *g*, supports a bevel-pinion, *h*, fitted by feather and groove upon the drill-spindle, so that the latter is free to move through the pinion, and a bevel-gear, *i*, upon the inner end of a horizontal driving-shaft, *j*, matches with and drives the drill-spindle pinion.

A supplemental frame, G, is firmly bolted to the side of the overhanging end of the head, and the driving-shaft extends through and has its bearings in this frame, which also carries a lower auxiliary shaft, H, and these two shafts carry adjustable gear-wheels, so arranged as to admit of any desirable number of changes of speed that may be required to adapt the machine to every variety of work, and to adapt the auxiliary shaft for use as the driving-shaft whenever it is necessary to obtain an increased speed for light drilling, or a reduced speed for heavy drilling, as will be presently more fully stated.

The supporting-bracket *g* for the drill-spindle pinion is bolted to the lower portion of this supplemental frame, and the framing of the drill is thus rendered compact and durable.

The drill-spindle has a continuous feed produced by a novel device, and the connections thereof with the main shaft are such as to give a feed in harmony with the increased or diminished speed of the drill-spindle. This feed device consists of a long pinion, I, adapted to mesh with gear-teeth J on the circumference of the hand feed-wheel, and is mounted in a carrier, I′, the lower end of which has its bearing upon a short shaft supported in a bracket, K, bolted to the front side of the head, contiguous to the supplemental frame. Upon this short shaft the long pinion is capable of being swung toward and from the hand feed-wheel gear to engage and disengage the feed.

A bevel-pinion, L, at the lower end of the long pinion, meshes with a like pinion, M, on the inner end of the short shaft, while a cog-gear on the outer end of the said shaft meshes with a pmion, O, on the main driving-shaft *j*, and thus drives the long pinion, and, through it, the spindle hand-wheel, which thereby is maintained in gear as the bit is fed down, the length of the pinion being equal to the vertical feed of the spindle.

A lever-catch, P, pivoted to the long-pinion frame I′, engages, by its inner lock-slotted end *k*, (see Fig. 5,) with a pin, *l*, on the head, and holds said pinion in gear with the spindle-wheel, the lock *l′* of the slot being such as to be detached from the pin by raising the end of the lever and pulling it forward, so that the long pinion can be put out of gear and the feed stopped. In this in-and-out movement of the long pinion its frame and bevel-pinion move concentric with the short shaft, which gives motion to said long pinion. This device gives a very easy and quick control of the feed at all times, and a regular and uniform feed.

The fly-wheel Q has an increased motion given to it over the drill-spindle during all or any of the varied motions or changes in the speed of the drill-bit. This is obtained by the arrangement of the fly-wheel upon an independent shaft, R, having its bearings in the sides of the head, and a pinion, S, which gears into a large gear-wheel, T, on the main driving-shaft, so that the fly-wheel has a much faster motion at all times than the drill-spindle, which gives a much easier and steady motion.

To secure any desirable speed for the drill-spindle, the auxiliary shaft H has a large cog-wheel, U, fixed thereon, to engage with an adjustable pinion, V, on the main shaft *j*, and give a high speed, while an adjustable pinion, W, on the auxiliary shaft is adapted to engage with a large gear-wheel, T, on the main shaft, and give a reduced speed. These pinions are fitted to feathers, to prevent them from turning on their shafts, and are provided with thumb-screws *m*, to hold them in place when out of gear.

To adapt the auxiliary shaft H as a driver, I provide its outer end with a pinion, X, which meshes with a similar pinion, Y, on a stud, Z, to which the crank or other power is applied.

When hand-power is used the end of the main shaft and the face of the pinion Y are provided with grooved heads *s s′*, to receive the shank *n* of the crank-handle *p*, in the manner of a dovetail, and fastened by thumb-screws *r*, so as to be lengthened or shortened to suit different classes of work.

The drill may be run by power by lengthening the shafts and placing thereon a pulley instead of a crank.

I may drive the fly-wheel by a spur-gear attached to or made integral with the large bevel-gear *i*, which drives the spindle. When the drill is run by the main shaft *j*, the supplemental shaft is out of gear.

In changing the gear for the different motions, the pinions only are moved; but the large wheels may be made adjustable, if desired, and the gears may be so arranged as to admit of any desired number of changes of speed that may be required.

The long pinion is swung out from the hand-wheel gear when it is desired to raise the drill-bit, as shown in Fig. 5.

I claim—

1. The combination of the long pinion I with the drill-spindle D E and gear F, said long pinion being arranged upon a pivot coincident with the axis of its driving-gear, and upon which it is swung into and out of gear with the spindle, to adapt said long pinion to feed and stop the feed of the drill-spindle, as herein set forth.

2. The long pinion I and its pinion L, arranged upon a pivot coincident with the axis of the driving-pinion M, in combination with the feed gear-wheel J, the drill screw-spindle D, and its driving-gear *h i*, substantially as herein set forth.

3. The combination, with the long pinion I, of the pivoted carrying-frame I′, the shifting-lever P *k*, and the locking-pin *l*, adapted for operation as set forth.

4. The combination, with the long pinion I, pivoted for adjustment, as described, of the gear N, the separate shafts *j* H, their driving-gears, the separate dovetail socket-heads *s s′*, and the outside pinions X Y, all constructed and adapted for operation with the crank-handle *p*, as set forth.

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

MARTIN L. EDWARDS.

Witnesses:
ALLAN A. THOMAS,
JAMES R. CAREY.