(No Model.)

W. H. LAW.

TRAVELING SWING DRILL.

No. 562,005. Patented June 16, 1896.

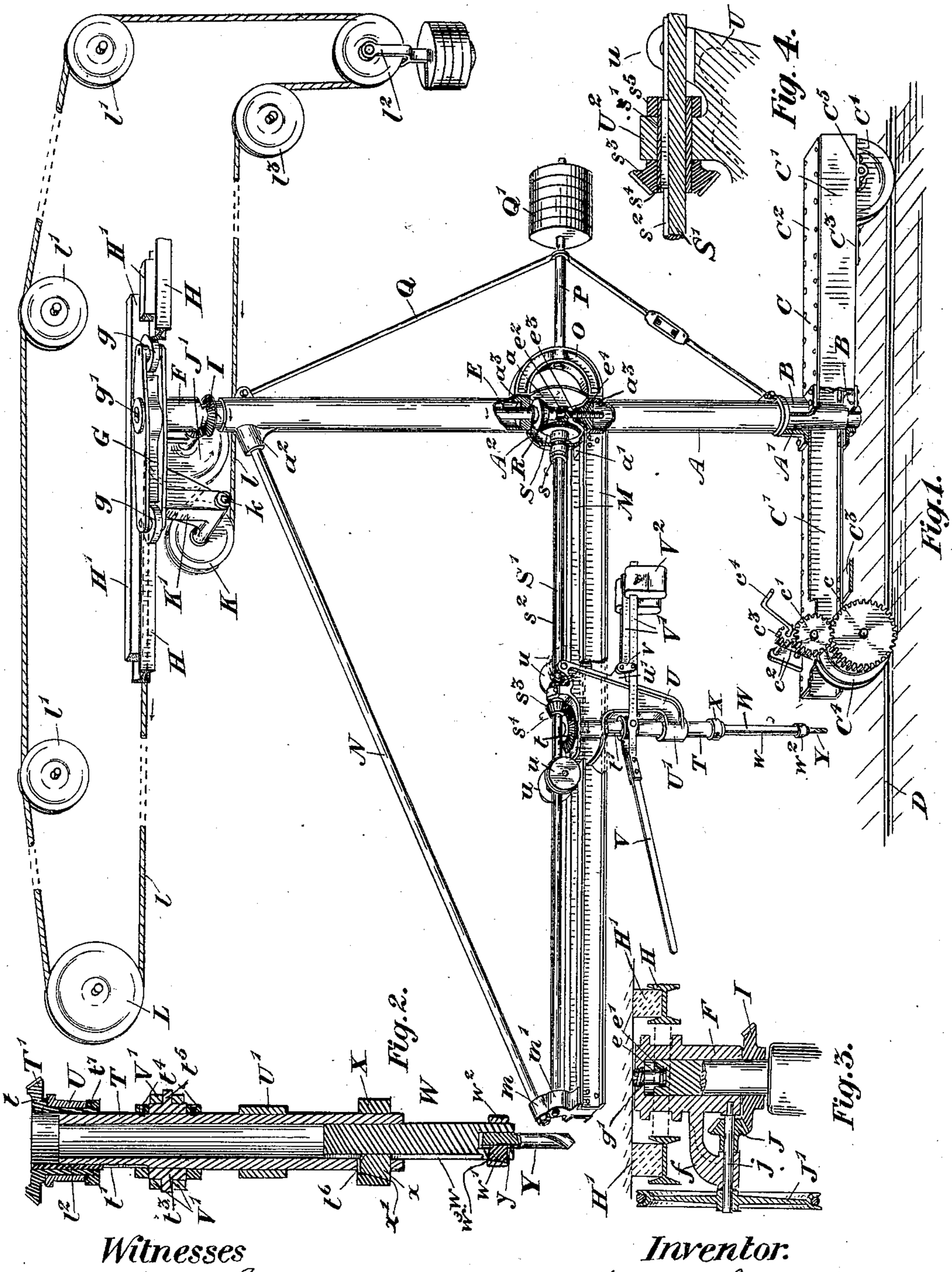

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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TRAVELING SWING-DRILL.

SPECIFICATION forming part of Letters Patent No. 562,005, dated June 16, 1896.

Application filed July 12, 1895. Serial No. 555,781. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HARTILL LAW, manufacturer, of the town of Peterborough, in the county of Peterborough, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Traveling Swing-Drills, of which the following is a specification.

My invention relates to improvements in traveling swing-drills and reaming-machines, and the object of the invention is to design a machine of this class which may be operated over a wide range of floor-space to accomplish more particularly the drilling and reaming of constructional ironwork; and it consists, essentially, of a vertical column journaled at the top and bottom in suitable frames adjusted longitudinally on guiding-rails, the column being provided with an arm and drill and operating mechanism of peculiar construction adjustable thereupon, and the drill being driven through the column by a peculiarly-arranged drive, as hereinafter more particularly explained.

Figure 1 is a perspective view of a machine constructed in accordance with my invention, portion of the drive being shown diagrammatically. Fig. 2 is a vertical section through the drill-spindles. Fig. 3 is a cross-section through the top carriage. Fig. 4 is a cross-section showing horizontal shaft in part and bevel-pinion.

In the drawings like letters of reference indicate corresponding parts in each figure.

A is a hollow column, the lower end of which has a bearing-spindle or pivot A′ secured in it which is journaled in suitable bearings B, secured at the top and bottom of the carriage C, which is formed in the following simple manner:

C′ are channel-irons, the open side being innermost.

C^2 is the top plate, which is suitably riveted to the top of the channel-irons.

C^3 are cross-plates suitably riveted to the bottom of the channel-iron.

C^4 are the double-flanged wheels, which are journaled in suitable bearings C^5, secured to the bottom of the channel-iron. The wheels C^4 are supported and run upon a track D, which may extend any distance desired.

c is a gear-wheel secured on the spindle of one of the wheels C^4.

c′ is an intermediate gear-pinion journaled in bearings C^2, secured at the top of the plate C^2 and meshing with the gear-wheel *c*.

c^3 is a pinion suitably journaled in the bracket c^2 and meshing with the gear-pinion *c′*.

c^4 is a crank-handle secured on the end of the spindle of the pinion c^3. By turning the crank-handle c^4 it will be readily understood that the carriage C may be moved along the track in either direction, so as to bring the column with its appurtenances to any desired position on the floor.

The column A has the main driving-shaft E extending through its upper portion, and the upper end of the shaft extends into a sleeve F, attached to or forming part of the carriage G, which is provided with end rollers *g*, as shown. The rollers *g* are designed to have a rolling contact with the guiding-rails H H, which are secured to the timbers H′, secured to the roof. By means of the carriage G, rollers *g*, and rails H at the top and the carriage at the bottom of the column A such column is maintained in an upright position during its longitudinal movement along the track.

The top of the shaft E has a cup-shaped recess *e*, within which fit the bronze disks *e′*. The recess *e* serves as a reservoir for oil, so as to keep the step always submerged in a lubricant. The spindle *g′* is screwed into and extends through the end of the sleeve F, the inner end of it being arranged to abut the bronze disks *e′*. This arrangement effectually reduces to a minimum the friction at this end caused by the turning of the shaft E.

I is a bevel-pinion secured to the shaft E beneath the sleeve F. The bevel-pinion I meshes with the bevel-pinion J, secured on the spindle *j*, having bearings in the bracket *f* and sleeve F. The pulley J′ is secured on the outer end of the spindle *j*. The shaft E is driven as follows:

K is an idler-pulley journaled on a spindle *k*, having bearings at the bottom of the bracket K′, attached to or forming part of the carriage G.

L is the main driving-pulley, which is secured to the shop-shafting.

l is a rope which extends from the pulley L around the pulley J′, back over and under

the pulley K to and over the pulley l^3, down to the weighted pulley l^2 up to and over the idler-pulleys l', and back to the pulley L. The rope l is intermediately broken away to indicate the extreme length of the same, and the idler-pulleys are suitably journaled in bearing-brackets attached to different portions of the roof. The rope l, hereinbefore described, is, it will be seen, endless. It will also be seen that the same conditions exist at the driven pulley J', whatever may be the distance of the column of the drill from the driving-pulley; also the tension on the rope can be maintained the same at all times, or changed, if desired, when light or heavy work is being done. There are other methods of drive which may be devised to use the same principle which I have described; but I prefer the form shown.

At the bottom of the shaft E is a suitable steel spindle resting on the adjustable step e^3, which is screwed into a bearing e^4, secured in the wheel-chamber of the column A. By this means the friction at this end of the shaft is reduced to a minimum, and the shaft is also provided with means for taking up the wear. The column is formed with a wheel-chamber A^2, having a back plate a.

M M is a double arm consisting of two channel-bars which extend outwardly from the column at right angles to it and is suitably secured to a lug a', formed on the column. The arm is supported at the outer end by a diagonal brace N, extending from a socket a^2 near the top of the column to a socket m, forming part of the bracket m', connecting the outer ends of the channel-bars.

O is an arc-shaped yoke spanning the wheel-chamber in the column A and connected to lugs A^3, formed on the column.

P is a strut extending outwardly from the yoke O, and Q is a truss-rod through which the strut extends intermediately and which is secured to suitable lugs formed on the column near the top and bottom.

Q' is a suitable balance-weight on the overhanging end of the strut P.

The truss-rod Q is designed to relieve the column of the bending strain produced by the load of the arm and drill, and the weight Q' serves to counterbalance this load.

When the arm of the machine is in the same plane as the two carriages, there is no pressure against the top guiding-rails; but the machine is sustained in this position by the bottom carriage, this being of such a length that the center of gravity of the drill is at all times between the end rollers and the column of the machine. Upon swinging the arm around in either direction the rollers g take a bearing against one or other of rails H, the maximum bearing being obtained when the arm is at right angles to the carriages and the drill-frame hereinafter described at the extreme end of the arm.

Upon the lower end of the shaft E, I secure a bevel-pinion R, which meshes with the bevel-pinion S, secured on the end of the shaft S', which is journaled at one end in bearings s, attached to or forming part of the front of the intermediate wheel-chamber formed in the column. The other end of the shaft S' is journaled in the bearing-bracket m'. The shaft S' is located centrally over the space between the channel-irons M. The shaft S' has a key-slot s^2 extending throughout its length.

s^3 is a bevel-pinion, which is secured on the end of a sleeve s', which is journaled in the bearing U^2, forming part of the frame U.

s^4 is a feather-key, which is secured in the sleeve s' and is adapted to slide within a key-slot s^2. The bevel-pinion s^3 is maintained in a stationary position in relation to the frame U by means of the collar s^5, secured to the opposite end of the sleeve s'. (See Fig. 2^a.) The pinion s^3 meshes with the bevel-gear t at the upper end of the hollow spindle T. The hub of the bevel-gear t extends through the frame U and has a collar t^7 on its lower end to keep it in proper relative position to the pinion s^3. The drill-frame U is supported upon the wheels u, which are arranged in pairs, one at each side of the shaft S, and are designed to roll upon the tops of the channel-irons M. The hollow spindle T extends up into the hub of the bevel-pinion t.

A key-slot t' is made in the hollow spindle T, in which slides a feather-key t^2, fitted into the inside of the hub of the bevel-gear t. The key-slot t' and key t^2 are designed to permit of a free upward movement of the telescopic spindle within the bevel-gear and yet connect them together as to rotation.

t^3 is a sleeve adjustably held on the spindle T by collars t^4.

t^5 are the trunnions formed on the sleeve t^3, as shown.

V is a divided lever, the divided ends V' being pivoted at each side upon the trunnions t^5, forming part of the sleeve t^3. The inner ends V' of the lever V have their fulcrum upon the links v, pivotally connected to the lugs u', forming part of the drill-frame U. Adjustable weights V^2 are provided at the ends V' of the lever V, and the ends of the lever are separated sufficiently so as to straddle the column when it is necessary to bring the carriage close to it. It will now be seen that the drill may be readily raised or lowered, as desired, by the lever V.

W is a drill-spindle extending into the spindle T, and X is a chuck which fits over the bottom end of the outer spindle T.

x is a key which extends through a slot t^6, made in the hollow spindle T, into a key-slot w, made in the spindle W. The outer edge of the key is beveled, and the chuck X has an internal recess x' of a corresponding bevel. The chuck X is pushed up, so as to enable the key to be inserted in the slot t^6, and when the chuck is brought down again the key is securely wedged between the back of the recess x' and the inside of the key-slot t^6. The

tendency when any upward pressure is exerted upon the spindle W is to still more securely bind together the wedging-block *x*, chuck X, outer spindle T, and spindle W, and thereby prevent such latter spindle from ascending. By this means a longer range of adjustment is provided, and the heavier the work the greater the resistance or the frictional hold on the spindle W. The tool Y is secured within the end of the drill-spindle W in a similar manner. It has a slot *y* made in it, and a key *w'* is provided with a beveled outer edge, as shown. The means of holding the tool Y, above described, is provided for its being readily released with the least possible labor, and the driving is positive and without any slip. A chuck w^2 is also provided having a recess w^3 with a corresponding bevel, and the tendency of the drill when at work is to be still more securely held within the holding-spindle.

The lever V, hereinbefore described, is utilized to lower the tool to or raise it from its work, and it may be also utilized to move the drill longitudinally on the arm, the carriage U serving to provide for the easy movement of the drill into any desired position. The weights V^2 serve to counterbalance the drill and the spindles.

In a machine constructed as above described a workman is enabled to drill or ream a hole at any point within a circle equal to twice the length of the arm formed of the channel-irons M. As the machine may travel to any desired point along the track the working range of the drill or reamer is vastly increased.

What I claim as my invention is—

1. In combination, the hollow vertical column, the upper and lower carriages supporting the same, the intermediate wheel-chamber formed in said column, the shaft journaled in the column above said chamber, the horizontal swinging arm, the drill carried on said arm, and the driving connections from the vertical shaft to the drill, substantially as described.

2. In combination, the hollow column, the supports for the same, the drill, the intermediate wheel-chamber in said columns the shaft journaled in the column above said chamber, and the bearing for the lower end of said shaft adjustable within said column.

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