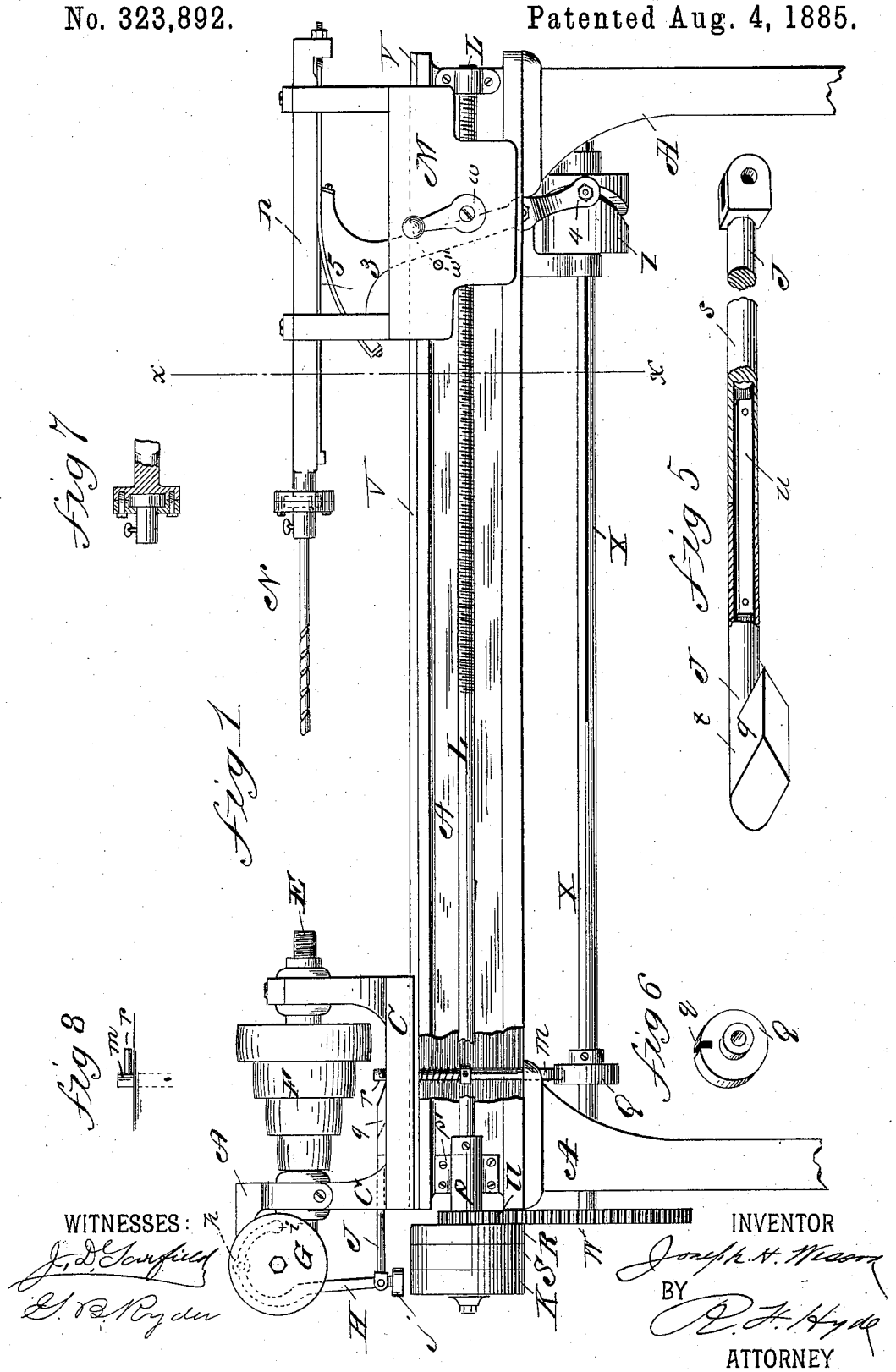
(No Model.) 2 Sheets—Sheet 1.

J. H. WESSON.

DRILLING MACHINE.

No. 323,892. Patented Aug. 4, 1885.



WITNESSES:
J. D. Sanfield
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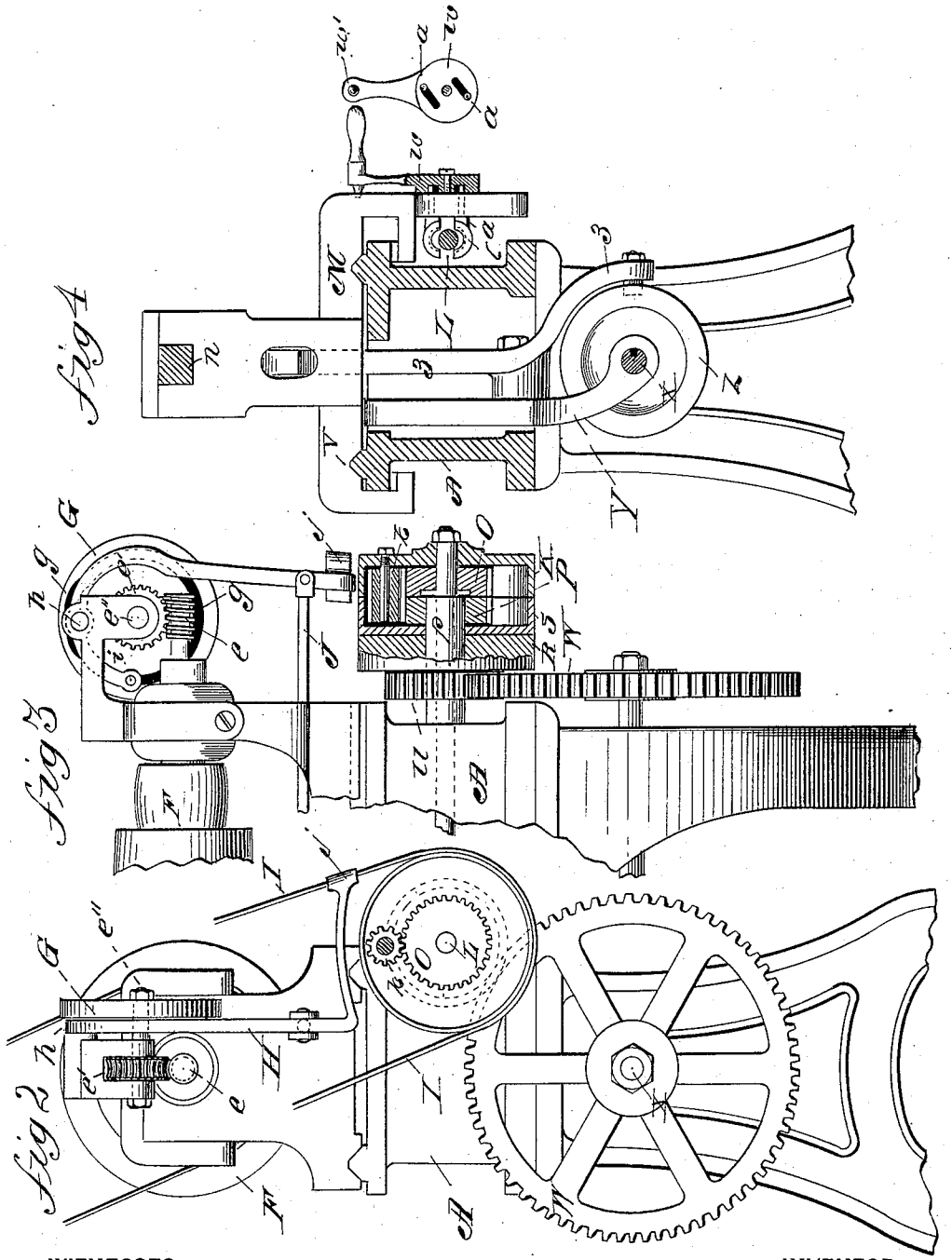

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UNITED STATES PATENT OFFICE.

JOSEPH H. WESSON, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO SMITH & WESSON, OF SAME PLACE.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 323,892, dated August 4, 1835.

Application filed September 8, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. WESSON, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Chucking and Drilling Machines, of which the following is a specification.

This invention relates to an improved metal drilling and chucking machine; and it consists, in brief, of mechanism for automatically at regular intervals withdrawing the tool from the work and restoring it thereto, to remove the chips by its withdrawal and enable the tool to be oiled during its reciprocation. Hitherto in machines of this class it has been necessary to reciprocate the tool manually; and the object of my invention now is to provide means in connection with the feed for automatically accomplishing this purpose, and for restoring the cutting-edge of the tool to the point in the work where it left off when retracted therefrom.

My invention is fully illustrated in the accompanying drawings, in which Figure 1 is a side elevation of my improved machine. Fig. 2 is an end elevation of the same. Fig. 3 is an elevation of part of the end of a machine upon the reverse side, shown in Fig. 1. Fig. 4 is a transverse section of the machine upon the dotted line *x x* of Fig. 1. Figs. 5, 6, 7, and 8 are detail views of parts of the machine.

A is the frame or body of the machine, having upon one end of its bed the head-stock C, journaling the chuck-spindle E and the driving-pulley F thereupon. The outer end of the spindle E is provided with a worm, *e*, engaging with a corresponding gear, *e'*, fast upon a shaft, *e''*, journaled in bearings from the outer post of the head-stock. Upon one end of shaft *e''* is fixed a cam, G, having upon its inner disk-face the cam-groove *g*.

Pivoted at *h* to the frame of the machine is a lever, H, provided with a cam-block or projection, *i*, upon one end, and adapted, as more particularly shown in Fig. 3, to have the end *i* received within the groove *g* to, by means of the rotation of the cam G, vibrate the free end of lever H. The otherwise-free end of lever H is provided with a belt-shipping fork, *j*, and has hinged to it an arm, J, for a purpose hereinafter described.

The belt I passes over a pulley, K, upon the end of feed-shaft L, and through the rotation thus imparted to the feed-shaft moves the tool-carrying tail-stock M toward the chuck-spindle E. The tail-stock M rests upon the bed of the machine and moves upon ways *v*, and is provided with a nut, *l*, through which passes the feed-shaft L. The work to be bored, held in a constantly-revolving chuck upon spindle E, has the drill N fed up to bore it by means of the feed shaft L.

As it is required in metal drilling to frequently withdraw the tool for the purpose of reoiling it, as well as to remove the chips, the tool is adapted to be reciprocated in the tail-stock independently away from the work while held from rotary motion, and this reciprocation has been generally accomplished by means of a hand-wheel in operative connection with the sliding tool, and requiring the constant attention of the machine-operator and skill in returning the cutting-edge of the tool to its work, to obviate which necessity for constant manual labor and skill in chucking and drilling, and to enable a workman with little care to run several machines, I have combined with the tail-stock and tool, and with the feed mechanism and live spindle, means to cause the feed to be intermitted at regular intervals, and the tool to be reciprocated during said stoppage of the feed, to have its cutting edge restored at the point, upon being brought back to the work, when the feed is resumed, at which it was retracted from said work, to thereby at regular intervals reciprocate the tool, feed it forward, and cause its cutting-edge and the work in the chuck to bear a fixed relation to each other.

The pulley K is journaled loosely, as shown in Fig. 3, upon the end of shaft L, and forms the partial shell of a train of differential gearing, and carries with it the spur-wheel *k*, journaled upon its inner face, to engage with the gears O P. The gear O is fast to shaft L, and the one P to a hollow stud, *p*, fastened to the frame A, and permitting the shaft L to pass through and revolve loosely within it. The gears O P are provided with teeth in about

the proportion of thirty-four to gear P and thirty-five to gear O. The stud *p* has loose upon it a pulley, R, coinciding in periphery with the one K, and has fixed to its side, to run loosely with it upon stud *p*, a gear, U. Intermediate to pulleys K R, and having its pulley-surface flush with them, is an idle-pulley, S, turning loosely upon stud *p* as its journal.

The gear U engages with the gear W. The gear W is fixed upon the end of shaft X, which shaft extends parallel to the feed-shaft L, and is, like it, journaled at both ends of the machine. From the underside of the tail-stock M an arm or connection, Y, passes through a longitudinal opening in the bed of the machine to inclose between its forked ends a cam-wheel, Z, splined upon shaft X, as shown more particularly in Figs. 1 and 4, so that the cam-wheel Z will move upon shaft X with the tail-stock as it is fed, and will also rotate with its shaft X. Pivoted to the tail-stock M is a lever, 3, having one end, 4, in operative connection with cam-wheel Z, and its other end connected to the tool-bar, supported in the posts of the tail-stock, so that the vibration of lever 3 reciprocates the tool N. This is more particularly shown in Fig. 1, where a segmental end, 5, of lever 3 is shown connected by steel straps to the bar *n* of tool N, so that through said connections no lost motion is allowed bar *n*.

Upon shaft X is fixed a wheel, Q, having a peripheral bearing-surface, with a notch, *q*, at a point therein, as shown in Fig. 6. The wheel Q, arranged beneath the head-stock C, has arranged above it a weighted or spring-actuated rod, *m*, adapted to have one end bear upon the periphery of wheel Q, and to be received into the notch *q*, and the rod *m* is supported in the frame of the machine to adapt it to lock shaft X, when projecting into the indentation *q*, to prevent the shaft X from rotating.

The upper end of the rod *m* is carried above the base of the head-stock, as shown in Figs. 1 and 8, and is provided with a pin or cross-head, I, which serves as a retaining-stop, and as a means of enabling the rod *m* to be lifted.

The arm J from lever H has its free end resting upon the head-stock, as seen in profile, Fig. 1, and so that the head *r* of rod *m* will be in its track, as it is reciprocated by lever H over the head-stock.

The arm J is of peculiar construction, adapting it to raise, and hold raised for a time, the rod *m* upon one part of its reciprocation, and upon the reverse movement pass over the projecting end of said rod to leave the rod undisturbed. This construction is shown in Fig. 5, where the arm J is shown in perspective in reverse, and in which *s* is one section, and *t* a corresponding one. These sections abut against each other, as shown in Fig. 5, and are united internally by a flat spring, *u*, having an end bolted to each, which spring permits a partial rotation of one section upon their common axis, and acts to restore said section when released. The section *t* is provided with a wedge-shaped head, *g*, adapted to pass under pin *r* of rod *m*, and lift the rod from the wheel Q, and of a configuration adapting said head to continue its movement under said pin *r*, to hold it for a time raised. In the rear of the head *g* a wedge-surface, parallel to the front wedge surface, causes the head *g*, upon said head coming against the pin *r*, on a reverse movement of arm J, to pass over the pin *r*, and leave it undisturbed, the spring *u*, permitting the section *t* to partially rotate upon an axis coincident with the section *s* held from rotating by its lever H.

The consecutive action of the mechanism is as follows: As seen in Fig. 1, the drill N is being fed in contact with the "pistol-barrel" or other article in the chuck, revolving with spindle E. The tool N is held from any reciprocation by reason of shaft X being locked by the rod *m*, although the splined cam Z slides with the tail-stock M. The shaft X being locked, the belt I rotating pulley K, carrying the spur *k*, by means of the rotation of pulley K, over gears P O, slowly feeds the tail-stock toward the head-stock.

When the cam G′ in its rotation, as seen in Fig. 3, vibrates lever H, the result of said movement is as follows: The arm J is moved to raise rod *m* to release shaft X, and while rod *m* is still raised the belt I is shifted from pulley K to the one R, leaving the feed-shaft L to have its rotation cease, while the shaft X, through gears U W, is rotated. The shaft X has rotated to cause the rod *m* when released to bear upon the periphery of wheel Q, and the continued rotation of shaft X by means of the cam-wheel Z vibrates the lever 3 to reciprocate the tool N. At the end of said reciprocation the rod *m* has entered the indentation in wheel Q, the shaft X and its connections are locked in the position seen in Fig. 1, and the belt I is shifted from pulley R to the one K, to continue the feed of the tool N, the positive connection between the driving-pulley F and the tool-operating mechanism causing the cutting-edge of the tool to resume cutting at the termination of its chip when retracted.

In Fig. 4 the feed-shaft L is shown operatively connected with the tail-stock M by means of a saddle-nut of peculiar construction, and consisting of an upper and lower nut-section arranged in a wing of the tail-stock to be on opposite sides of the feed shaft, and have shanks *a a* pass through slots in the wing of the tail-stock and project beyond. Said slots are in direction at right angles to the axis of shaft L, and are adapted to guide the shanks *a a* in a movement to and from each other. Centrally between said slots, and aligned with them, is the pivot of a disk-wheel, *w*, having slots in its face adapted to receive the projecting ends of shanks *a a*. These slots in disk *w* are eccentric to its pivot, so that a rotation of said disk will cause the walls of the slots to act as cams upon the pro-

jecting shanks *a a*, to separate the sections of the saddle-nut or close them upon the feed-shaft. The disk-wheel *w* is provided with a spring handle, and to enable the saddle-nut to be secured in both a closed and open position the end of the spring-shank to the handle, as seen in Fig. 4, is provided with a detent, *w'*, and in its track upon the face of the tail-stock wing are corresponding sockets *w''*, into which the detent springs when opposite the same, to thus lock the nut in either position.

Now, having described my invention, what I claim is—

1. The within-described improved machine for chucking or drilling, consisting of a frame and bed, a head-stock, as C, a constantly-revolving chuck-spindle, E, a tail-stock adapted to move over the machine-bed, a drilling-tool combined with said tail-stock and adapted to be reciprocated therein, a shaft journaled in the machine-frame, connected with said tail-stock and adapted to feed it over the bed, an auxiliary cam-bearing shaft, X, journaled in the machine-frame parallel to the feed-shaft, means for revolving said shafts, a cam splined to shaft X to revolve with it, means from the tail-stock for carrying the said cam with it upon shaft X in its movement over the machine-bed, means connected with the tail-stock, the tool, and with the cam upon shaft X, and adapted to convert the rotation of the latter to a reciprocation of the tool, and means, substantially as shown and described, in operative connection with the chuck-spindle for alternately stopping the feed and auxiliary shaft, and for permitting the rotation of one while the other is at rest, as and for the purpose set forth.

2. The within-described improved machine for chucking or drilling, consisting of a machine frame and bed having at one end a head-stock supporting a chuck-spindle, as E, a tail-stock supporting a drill and adapted to move over said bed, a feed-shaft operatively connected with said tail-stock and journaled in the machine-frame, an auxiliary shaft, X, journaled in the frame parallel to the feed-shaft, a cam, Z, splined upon shaft X and connected to the tail-stock to slide upon said shaft, a lever, 3, pivoted to the tail-stock, to have one end in operative connection with cam Z, and its other, substantially as shown, with the drill, and adapted to reciprocate the drill by its vibration, a revolving chuck-spindle, E, and means for revolving it, a sectional pulley containing differential gears O P, the one pulley operatively connected with the feed-shaft, and the other with shaft X, substantially as shown, a belt, I, for driving said pulleys, and mechanism, substantially as shown and described, in operative connection with the chuck-spindle and belt I, and adapted to cause the revolution alternately of the feed-shaft and shaft X and to hold the latter shaft while the former is revolved, for the purpose set forth.

3. In machinery for chucking and drilling, the combination, with a feed-shaft, L, and shaft X, operatively connected with the tail-stock, substantially as shown, and their ends with gearing U W and driving-pulleys K R, arranged, as shown, respectively with shafts L and X, and with a belt, I, of shipping-lever H, cam G, worm-gears *e e'*, and revolving spindle E, all combined and operating substantially as shown and described, and arm J, rod *m*, and wheel Q, having a stop upon its periphery operated by the vibration of lever H, for the purpose set forth.

4. In a chucking and drilling machine, the combination, with rod *m*, adapted to bear upon the periphery of wheel Q and in the indentation therein, and having a lifting-head projecting above the machine, as shown, of a reciprocating arm, J, adapted to pass under said head to lift rod *m* at one stage of its reciprocation and upon the reverse to pass over said head to leave it undisturbed, substantially as shown and described, and for the purpose set forth.

JOSEPH H. WESSON.

Witnesses:
R. F. HYDE,
J. D. GARFIELD.