2 Sheets—Sheet 1.

O. P. BRIGGS.

Bolt-Threading Machine.

No. 199,686. **Patented Jan. 29, 1878.**

Fig. 1

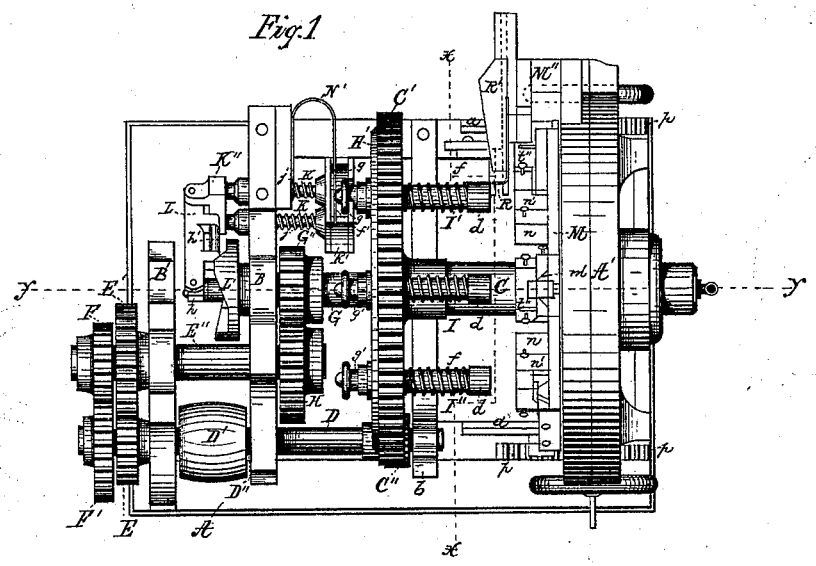
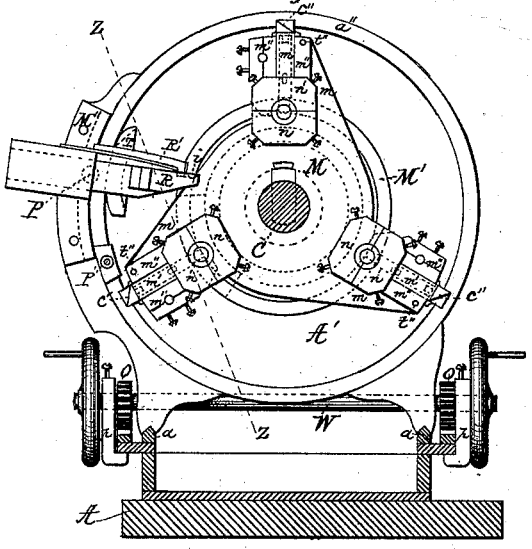


Fig. 2



Witnesses
G. C. Hoffman
N. Towles

Inventor
Orlando P. Briggs
By Bridley & Sherburne
Attys

2 Sheets—Sheet 2.

O. P. BRIGGS.

Bolt-Threading Machine.

No. 199,686. Patented Jan. 29, 1878.

Fig. 4

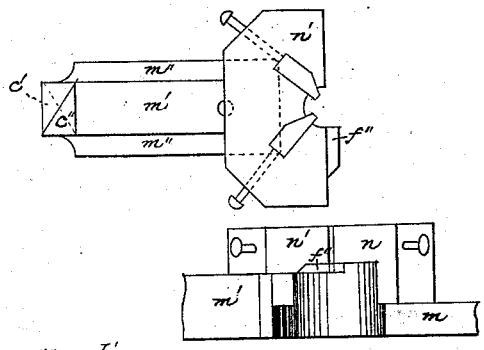


Fig. 3

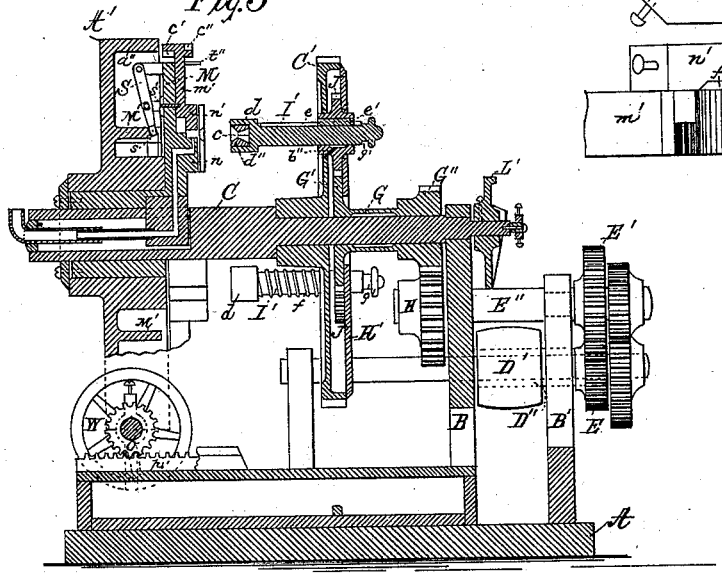


Fig. 5

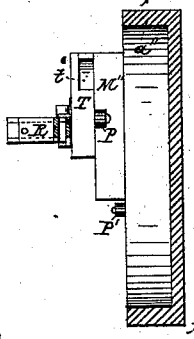
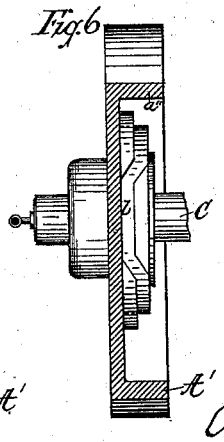


Fig. 6



Witnesses
G. C. Hoffman
N. Cowles

Inventor
Orlando P. Briggs
By Gridley & Sherburne
Attys

UNITED STATES PATENT OFFICE.

ORLANDO P. BRIGGS, OF CHICAGO, ILLINOIS, ASSIGNOR TO HENRY F. OLIVER, OF SAME PLACE.

IMPROVEMENT IN BOLT-THREADING MACHINES.

Specification forming part of Letters Patent No. **199,686**, dated January 29, 1878; application filed November 20, 1877.

To all whom it may concern:

Be it known that I, ORLANDO P. BRIGGS, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bolt-Threading Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 represents a general plan or top view of a bolt-threading machine embodying my said invention. Fig. 2 represents a transverse sectional elevation, showing those parts of the same which are at the right hand of the line *x x*, drawn across Fig. 1. Fig. 3 represents a longitudinal section of the same, taken on the line *y y*, drawn through Fig. 1. Fig. 4 represents a detail plan of the movable portion of one of the die-blocks detached. Fig. 5 represents a detail section of the tail-block, showing those parts which are at the left hand of the line *z z*, drawn across Fig. 2, with die-blocks removed; and Fig. 6 represents a like section, showing those parts which are at the right hand of the line *z z*, Fig. 2.

Like letters of reference indicate like parts.

My invention relates to that class of machines employed in cutting the screw-thread on metal bolts; and the object of my invention is to improve that class of machines, so as to render their operation more expeditious and complete.

To that end my invention consists in the arrangement of the several parts, as hereinafter more fully described and claimed.

In the drawing, A represents the base or bed of the machine, which may be made in the form shown, or in any other suitable form that will receive the operating parts. A′ represents an annular tail-block, which is supported upon guides or ways *a a*, permanently attached to one end of the bed A, and so as to admit of a rectilinear movement of the tail-block in the direction of the length of the bed.

B and B′ are stationary head-blocks, which are permanently attached to the bed A at its end opposite to the tail-block A′, as shown in Figs. 1 and 3.

C represents a longitudinal shaft, which passes through the center of the tail-block A′, and is journaled at one end within the said tail-block, and at the opposite end to the head-block B, and so as to admit of a free and easy rotary movement. C′ represents a geared disk or wheel, which is permanently mounted upon the shaft C, at a point between the head-block B and tail-block A′, and is adjusted to engage with a gear-pinion, C″, on the main driving-shaft D, which shaft is journaled at one end within an upright, *b*, attached to the bed A, and at the opposite end to or within the head-blocks B and B′, as shown in Fig. 1.

D′ represents the main driving-pulley, around which is passed a belt, (not shown,) communicating with any suitable motor for imparting motion to the moving parts of the machine. This pulley D′ is permanently mounted upon a sleeve, D″, which has its bearings on the shaft D, and upon which sleeve is mounted a gear-pinion, E, adjusted to engage with a gear-wheel, E′, on a horizontal shaft, E″, journaled within the head-blocks B and B′, by which means a rotary motion is imparted to the shaft E″ by the rotation of the sleeve.

F represents a gear-pinion, which is permanently mounted on the shaft E″, and adjusted to engage with a gear-wheel, F′, on the outer end of the main driving-shaft D, by which means a rotary motion is imparted to the said shaft D, and also to the disk C′, through the medium of the pinion C″, by the rotation of the shaft E″. The arrangement of this system of geared wheels and pinions is such as to reduce the velocity of the disk C′ below the velocity of the driving-pulley D′ and its sleeve D″, and thereby increase the power of the disk.

G represents a hollow sleeve, which is loosely mounted upon the shaft C between the disk C′ and the head-block B, and is so arranged as to freely revolve on the said shaft, and is provided at one end with a gear-wheel, G′, adjusted to revolve within the disk C′, and at the opposite end with a gear-pinion, G″, which engages with a gear-wheel, H, on the inner end of the shaft E″, as shown in Fig. 3.

I, I′, and I″ represent mandrels, which pass through the disk C′, between its periphery and the periphery of the wheel G′, and in planes

parallel with the plane of the shaft C, and are each enlarged at the end adjacent to the tail-block A′, so as to form a head, *d*, within which is formed a socket, *e*, to receive the head of the bolts to be threaded.

Mounted upon each of these mandrels is a pinion, J, which engages with the wheel G′ on the sleeve G, as shown in Fig. 3. The hub of each of these pinions is elongated, so as to form a journal, which has its bearing at one end within the end wall of the disk, and at the opposite end within a face-plate, H′, attached to the end of the disk adjacent to the head-block B.

The mandrels are each provided with a longitudinal key-seat, *e*, which receives a feather, *e′*, permanently attached to the pinion, by which means the mandrels are made to revolve with their respective pinions, and at the same time admit of being moved in the direction of their length to or from the tail-block A′, independent of the pinions.

Loosely mounted upon and around each of the mandrels, between the head *d* and the disk, is a coiled spring, *f*, which is so adjusted as to hold the mandrel in a fixed position, and at the limit of its movement toward the tail-block, and against the head of the bolt being threaded, when not positively acted upon, as hereinafter described.

K K are short shafts, which pass loosely through the head-block B in planes parallel with each other, and are so arranged as to admit of a free and easy longitudinal movement to or from the disk C′.

K′ represents a cross-head, which is so formed as to describe the arc of a circle, and is attached to the end of the shafts K K, between the head-block B and disk C′, and so that its radius will correspond with the radius of the circle described by the mandrels as the disk is rotated, and is provided on its face, adjacent to the disk, with circular flanges arranged in parallel planes, and projecting inward toward the disk, and so as to form a circular groove or channel, *f′*, through which the end of the mandrels pass as they are carried around by the rotation of the disk. Permanently attached to the inner edge of each of these flanges is a circular rib, *g*, which takes into a groove, *g′*, formed around the end of each of the mandrels, as the latter pass through the groove *f′* of the cross-head, by which means the mandrels are moved in the direction of their length and from the tail-block A′ by a longitudinal movement of the shafts K K, and during the time the end of the mandrels are passing through the groove in the cross-head.

K″ represents a cross-bar, which is attached to the end of the shafts K K opposite to the cross-head K′. L represents a shifting-lever, which is pivoted at one end to the center of the cross-bar K″, and at the opposite end to a block, *h*, loosely mounted upon the shaft C, and is provided with an anti-friction roller, *h′*, which bears against the face of a cam-wheel, L′, on the shaft C, as shown in Fig. 1.

The arrangement of the cams on the wheel L′ is such as to move the outer end of the shifting-lever L outward, or from the head-block B, as the shaft C is rotated, and so as to move the shafts K K and cross-head K′ from the disk, and at the time the ends of the mandrels have entered the groove or channel in the cross-head, by which means the respective mandrels are moved in their turn from the tail-block A′, and at the proper time to discharge the head of the bolt which has been threaded from the socket in the mandrel, and to receive the next bolt to be threaded.

Loosely mounted upon each of the shafts K K, between the cross-head K′ and the head-block B, is a coiled spring, *j*, which is so adjusted as to hold the said shafts in a fixed position, and at the limit of their movement toward the disk, when not positively acted upon by the cams on the wheel L′ through the medium of the cross-bar K″.

M represents a die-plate, which is mounted upon the shaft C near the inner face of the tail-block A′, and is so arranged upon the said shaft as to revolve with it, and at the same time admit of being moved upon the shaft to or from the disk C′. This die-plate is provided with a series of radial arms, *m*, which extend outward to a point near the inner face of an annular flange, *a″*, on the face of the tail-block which is toward the disk.

n represents the fixed half of the die-blocks, one of which is attached to each of the arms *m* of the die-plate. *n′* represents the movable half of the die-blocks, which are each attached to a slide, *m′*, secured within guides or ways *m″*, attached to the arms *m* of the die-plate, and so as to allow each slide and its die-block to be moved to or from the fixed die-block *n* when required.

The two halves of each of the respective dies are so arranged that when adjusted to a working position preparatory to receiving the end of the bolt to be threaded, they will be in the same plane with their respective mandrels, as shown in Fig. 3.

M′ represents an annular rim, which is permanently attached to or formed as a part of the tail-block A′, and so as to project inward toward the die-plate, and is provided with a cam-groove, *l*, formed through its periphery, as shown in Fig. 6, and so that the center of the groove vertically will be in the same horizontal plane with the center of the cross-head K′. M″ represents a lug, which is permanently attached to the periphery of the tail-block, and so as to project toward the disk C′, and so that its center vertically will be nearly in the same radial plane with the center of the cam-groove *l* in the rim M′. P represents an anti-friction roller, which is loosely mounted upon a pivot secured to the lug M″, and P′ represents a like roller, which is mounted upon a pivot secured to the flange *a″* of the tail-block.

Each of the slides m' of the movable die-blocks is provided at its outer end with wedge-shaped lugs c' and c'', located on opposite sides of the same, and so that the plane of the angle of their respective faces will cross each other, as shown by dotted lines, Fig. 4.

The arrangement of these lugs is such that as the die-blocks are carried around by the rotation of the die-plate with the shaft C and disk C′, the lug c' will first engage the roller P′, so that the incline on the lug will slide over the roller, and thereby move the slide and its die-block outward, so as to open the dies, and at the time the corresponding mandrel is moved backward from the dies by the receding movement of the cross-head, and so that the bolt which has been threaded is automatically discharged from the dies and mandrels, and by a further movement of the die-plate the lug c'' is brought in contact with the roller P, so as to force the slide and its die-block back to their normal position, and so as to close the die-blocks preparatory to receiving the next bolt to be threaded, and immediately before the cross-head ceases to act upon the mandrel.

Fulcrumed to the outer end of each of the arms of the die-plate, and on the side thereof opposite to the die-blocks, is an auxiliary lever, S, extending inward toward the center of the plate, and is provided at its inner end with an anti-friction roller, s, adjusted to bear against the face of the rim M′, and to pass through the cam-groove l as the die-plate is carried around by the rotation of the shaft C. These levers are each provided with a stop-pin, s', which passes through an opening in the arm and into the movable die-block, as shown in Fig. 3.

The arrangement of these levers is such that as the die-plate is carried around the roller on the respective levers will bear against the face of the rim M′, and so as to hold the stop-pin within the movable die-block, and thereby prevent the dies from being opened during the operation of cutting the thread on the bolt, and so as to allow the roller to enter the groove l in the rim, by which means the inner end of the lever is moved outward, so as to withdraw the pin from the die-block immediately before the lug c' engages the roller P′, and as the roller passes through the groove and against the face of the rim, the inner end of the lever is forced back to its normal position, and so as to cause the stop-pin to again enter the die-block as the latter is closed by the action of the roller P, and immediately before the bolt to be threaded enters the dies.

R represents a horizontal slide, which is secured in guides or ways attached to the lug M″, and is so arranged as to admit of being adjusted to bring the inner end of the slide at a central point between the die-blocks and end of the mandrels, as shown in Fig. 1, and is so arranged as to admit of a free and easy longitudinal movement. R′ represents a receptacle, which is rigidly attached to the lug immediately over the slide, and into which the bolt-blanks are placed. The slide is provided at its inner end with a transverse groove, i, of the proper size to receive a single bolt, and is so located as to be immediately under an opening in the bottom and at the inner end of the receptacle when the slide is at the limit of its outward movement.

T represents an adjusting-block, which is permanently attached to the edge of the slide toward the tail-block, and is provided with a cam-groove, t, through which passes an adjusting-pin, t'', on each of the respective arms of the die-plate.

The arrangement of the groove t and adjusting-pins t'' is such that as the die-plate is carried around by the rotation of the shaft C the pin t'' will first enter the groove and force the slide back, so as to bring the transverse groove i of the slide under the opening in the receptacle, when a bolt-blank will fall through said opening into the groove, and by a further movement of the die-plate the adjusting-pin bears against the opposite wall of the groove t, so as to move the slide inward toward the shaft C, and so as to bring the bolt-blank in the same plane with the die-block and mandrel, and at the proper time to allow the end of the blank to enter the dies and the head of the blank to enter the socket in the mandrel as the opposite end of the mandrel passes from the groove in the cross-head.

N′ represents a pressure-spring, which is secured to the head-block B, and so arranged as to bear against the end of the respective mandrels as the same pass from the groove in the cross-head, the object of which is to force the end of the bolt-blank into the dies, so as to cause the thread in the dies to engage therewith. W represents a transverse shaft, which is journaled to the tail-block A′, as shown in Fig. 2, and so as to move with the tail-block. O O represent gear-pinions, which are mounted upon the shaft W, and are so adjusted as to engage with gear-racks p p, permanently attached to the bed A, and so that as the said shaft is made to rotate the tail-block is caused to move to or from the disk, the object of which is to adjust the dies to bolts of different lengths.

The face-plate H′ is so attached to the rim of the disk as to form an oil-chamber within the disk, and within which the pinions operating the mandrels revolve, and each of the said pinions is provided with an oil-opening, b'', which communicates with the oil-chamber, and extends through the hub of the pinion to the mandrel, the object of which is to render the pinions and mandrels self-lubricating at each revolution of the disk, which causes the pinions to pass through the oil which is in the chamber below the center of the disk.

The socket in each of the mandrels is provided with a ring, d'', within which the opening to receive the head of the bolt is formed. These rings are so arranged as to admit of being removed at will and other rings having differ-

ent-sized openings substituted, the object of which is to adapt them to receive bolt-heads of different sizes.

The movable die-blocks are each provided with a lip, f'', formed on its edge adjacent to the fixed die-block, and which lip is so arranged as to pass into a recess formed in the edge of the fixed die-block, or into a recess between the die-block and face of the arm, as shown in Fig. 4. The object of this lip is to hold the movable die-block in the same plane with its fixed die-block during the operation of cutting the thread on the bolt.

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

1. The combination, with the revolving disk C′, carrying the series of bolt-holding mandrels, and geared wheels for rotating said mandrels, and the revolving die-plate M, carrying the series of screw-cutting dies, of the non-revolving tail-block A′, forming the journal-bearing at one end of the shaft carrying the disk, and supporting the mechanism for opening and closing the dies, and arranged to admit of being moved together with the die-plate to or from the disk, substantially as and for the purpose specified.

2. The combination, with the shaft C and disk C′, carrying the series of bolt-holding mandrels, and the geared wheels for rotating said mandrels, of the block h, cam-wheel L′, shifting-lever L, roller h', cross-bar K″, shafts K K, springs $j\,j$, and cross-head K′, all operating together substantially as and for the purpose specified.

3. The combination, with the revolving die-plate M, carrying the series of fixed and movable die-blocks n and n', of the wedge-shaped lugs c' c'' and rollers P and P′, for opening and closing the dies, substantially as and for the purpose specified.

4. The combination, with the revolving die-plate M, carrying the series of fixed and movable die-blocks, of the series of auxiliary levers S, stop-pins s', and rim M′, provided with the cam-groove l, substantially as and for the purpose specified.

5. The combination, with slide R and receptacle R′, for automatically feeding the bolt-blanks, of the adjusting-block T, provided with the cam-groove t and the series of adjusting-pins t'', for moving the slide, substantially as and for the purpose specified.

6. The combination, with the fixed die-block n, of the longitudinally-movable die-block n', provided with the lip f'', projecting therefrom, and so as to pass into the recess formed in or under the fixed die-block, the stop-pin s', arranged to enter the opening in the movable die-block, and the mechanism for actuating said stop-pin, substantially as and for the purpose specified.

7. The combination, with the revolving disk C′, carrying the series of bolt-holding mandrels and pinions for rotating the same, of the face-plate H, arranged to form the journal-bearings at one end of each of the pinions, and so as to form the oil-chamber within the disk, for lubricating the pinions and mandrels, substantially as specified.

ORLANDO P. BRIGGS.

Witnesses:
G. R. HOFFMAN,
N. C. GRIDLEY.