

(No Model.)

3 Sheets—Sheet 1.

J. BRUDERER & O. C. BURDICT.
MACHINE FOR THREADING BOLTS.

No. 306,317

Patented Oct. 7, 1884.

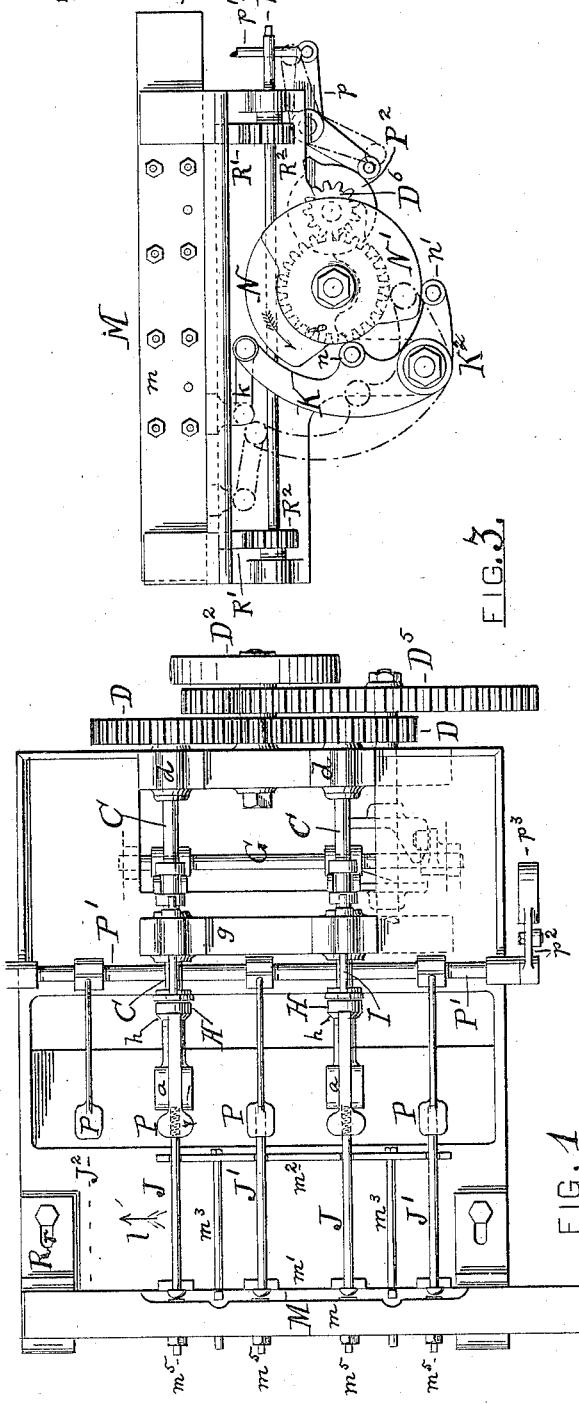


FIG. 1

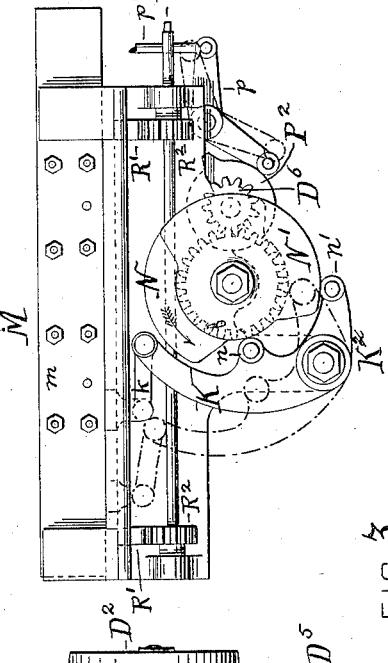


FIG. 3

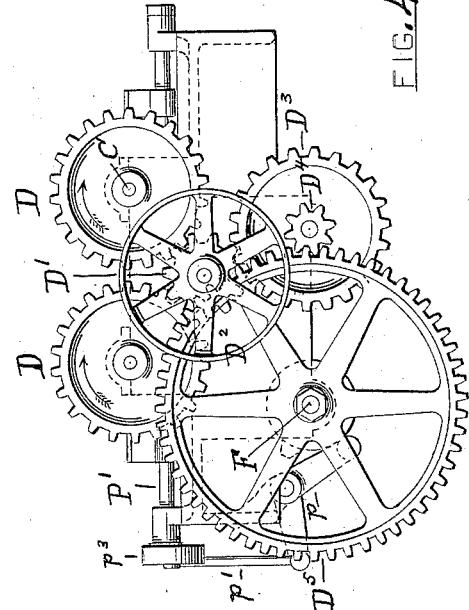


FIG. 4.

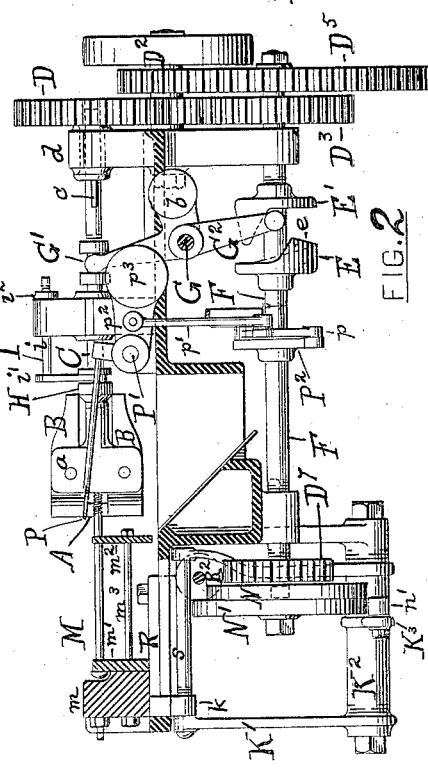


FIG. 2

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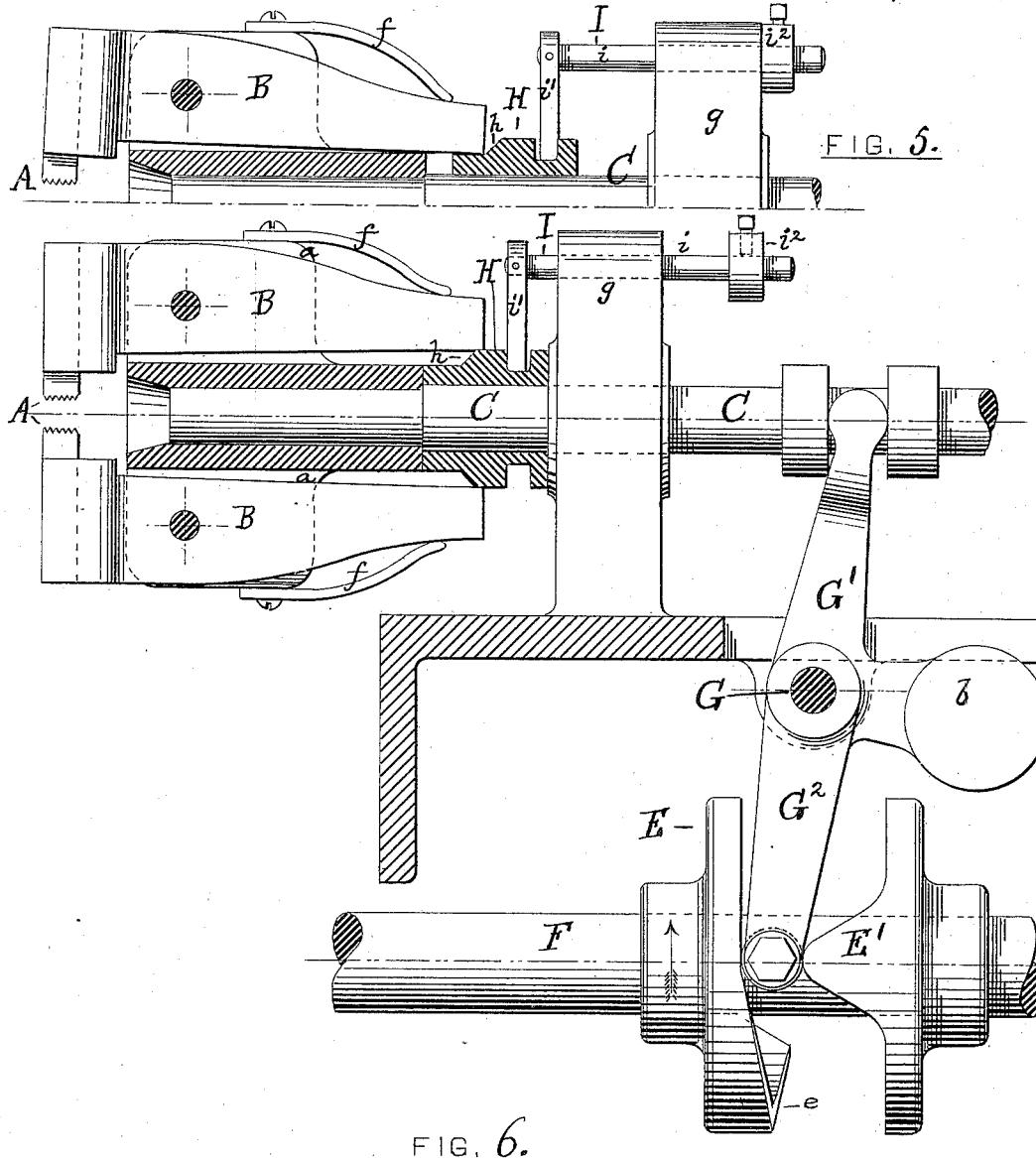
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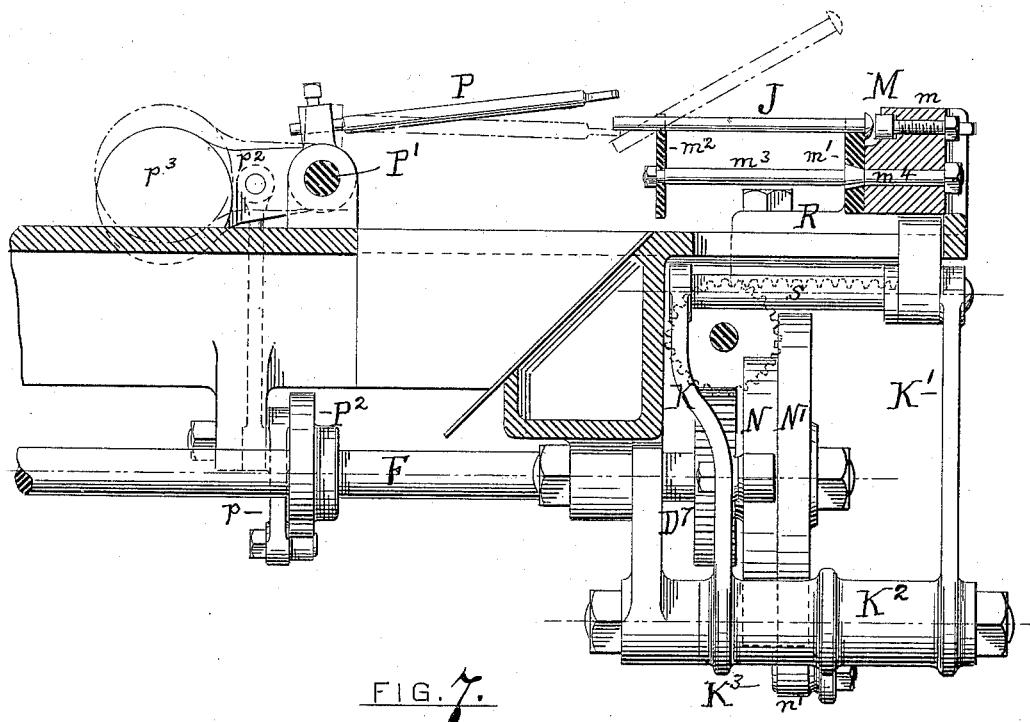
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UNITED STATES PATENT OFFICE.

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MACHINE FOR THREADING BOLTS.

SPECIFICATION forming part of Letters Patent No. 306,317, dated October 7, 1884.

Application filed February 26, 1884. (No model.)

To all whom it may concern:

Be it known that we, JOHN BRUDERER, a citizen of Switzerland, residing at Philadelphia, in the county of Philadelphia, and State of Pennsylvania, and ORRIN CLARK BURDICT, of Buffalo, in the county of Erie and State of New York, have made an invention of certain new and useful Improvements in Machines for Threading Bolts; and we do hereby declare that the following, in connection with the accompanying drawings, is a full, clear, and exact description and specification of the same.

The object of this invention is to enable screw-bolts, such as are generally used in carriages, agricultural machines, and machines generally, to be threaded with a small expenditure of labor, so that one attendant can control the threading of a number of bolts, and can feed them to the machinery without loss of time by the threading devices.

To this end our invention consists of certain combinations of mechanical devices, which are set forth in detail in the claims at the close of this specification.

In order that these combinations may be fully understood, we have represented in the accompanying drawings, and will proceed to describe, a bolt-threading machine embodying them in the best form we have devised previous to this date, it being understood that the mechanism employed may be varied as circumstances or the views of different users of our combinations render expedient.

Figure 1 of said drawings represents a plan of said machine, with certain parts removed. Fig. 2 represents a side view thereof, with parts of the frame removed. Fig. 3 represents a front view of the bolt-carriage mechanism. Fig. 4 represents a view of the rear end of the machine. Figs. 5, 6, and 7 represent parts of the machine separated from the residue, and drawn upon a larger scale than the other figures.

In the machine represented in the said drawings, the threads are cut upon the points of the bolts by means of sectional dies A, having the form of jaws, which are carried by levers B B that are pivoted to the head a of a revolving mandrel or spindle, C, so that the

jaws or sectional dies may be opened and closed by the movement of the jaw-levers on their pivots, and so that the jaws may be revolved by the revolution of their die-spindles for the purpose of cutting the threads upon the bolts. In the machine represented there are two sets of these sectional jaw-dies, with their respective die-spindles; but the number may be increased or diminished, as found expedient, and we prefer to have as many of them in one threading-machine as can be conveniently attended to by one attendant. Each die-spindle is caused to revolve by means of gearing, and in the present case the gearing for each spindle consists of a cog-wheel, D, whose teeth are engaged with those of a driving-pinion, D', which is fitted to revolve upon a stud and has a driving-pulley, D'', secured to it for the driving-belt.

In order that the die-spindles C may move longitudinally, so as to advance the dies upon the point of the bolt being cut, each spindle cog-wheel D is secured to a sleeve which is supported in a box-bearing, d, and the spindle is fitted to slide longitudinally through said sleeve, but is caused to revolve with it by means of a spline, c, sliding in a groove in the sleeve of the cog-wheel. In the said machine the dies are moved forward or advanced upon the points of the bolt and are moved backward by means of cams E E', which are secured to a cam-shaft, F, which is caused to revolve at the required speed by being connected by cog-gearing D'' D' D'' with the driving-pinion D'. These cams operate upon the die-spindles through the intervention of the rock-shaft G, the forked arms G' G', which connect the die-spindles with the rock-shaft, and the arm G'', which is operated by the cams.

In order to facilitate the backward movement of the die-spindles each forked arm is fitted with a counter-weight, b. The advancing-cam E has its grade e of the proper slope to advance the dies in accordance with the pitch of the screw-threads to be cut. The withdrawing-cam E' has a grade of steeper slope, so as to make the backward movement of the dies rapid. The said machine is so arranged that when the dies are withdrawn to

their most backward positions they are closed ready for cutting the screw-threads on the bolt. While so closed they are caused to advance upon the bolt by the advancing-cam E, 5 above described, and they are opened during the last part of their advancing movement so as to free the threaded bolt. For these purposes a sleeve, H, with a conical hub, h, is mounted loose upon each die-spindle in such 10 a position relatively to the shanks of the die-levers B B that when they are in their most backward positions, as represented in Fig. 6, the rear end of the sleeve H abuts against a cross-bar, g, of the frame, and the shanks of 15 the die-levers are separated by the hub, while the dies A at the front end of the die-levers are closed to cut the threads on the bolt. The die-levers and sleeve retain these relative positions while the die-spindle is advanced, as 20 the frictional contact of the shanks of the die-levers with the sleeve causes the latter to move forward with them. But as the dies with their spindle approach their most forward position the advancing movement of the sleeve H is 25 stopped, while the die-levers continue to advance, so that the shanks of the die-levers are moved off of the hub h of the sleeve to the smaller part thereof, as represented in Fig. 5, 30 whereby the dies are permitted to separate or open and release the threaded bolt.

In order to insure the opening of the dies, and to hold them open until they are to be closed, the head of the die-spindle is fitted with springs f, which bear upon the shanks of the 35 die-levers and force them toward each other, as represented in Fig. 5. The levers and sleeve remain in their relative positions as shown in Fig. 5 during the greater part of their backward movement, but as they approach the end thereof, the sleeve H abuts against the cross-bar g, which stops its further movement, and the continued backward movement of the die-levers forces their shanks against the conical portion of said sleeve, 40 whereby the dies are closed, as represented in Fig. 6.

In order that the advancing movement of the sleeve H may be stopped at the proper place in the forward movement of the jaws, 45 the stop I is provided, it being in this instance composed of a rod, i, (which is fitted to slide in the bar g of the frame,) of the arm i', (which is engaged in a groove in the hub of the sleeve,) and of a stop-collar, i'', which is secured to the 50 rod i by a set-screw. In the said machine the bolts which are to be threaded are presented to the threading-dies, and are removed from the places where these dies operate by means of a bolt-carriage, M. This carriage in the 55 present example is a frame composed of bars m m' m'' and the stays m'', which connect them together. It is fitted to slide upon the frame of the machine in directions crosswise of the axial lines of the die-spindles, and the upper 60 edges of two of its bars are notched to form bolt-holders for the bolts J J'.

The machine represented is adapted to the threading of carriage-bolts which have square necks under their heads; hence one of the bars, m', of the bolt-carriage, has square notches or 70 bolt-holders in it to receive the square necks of the bolts, and the bar m'' by which the points of the bolts are supported, has V-formed notches or bolt-holders to receive them. The part m of the carriage-frame adjacent to the bar m' 75 is recessed to give room for the heads of the bolts when lying on the bolt-carriage, and screw-bearings m''' are provided for the heads of the bolts. The bolt-carriage has two sets of bolt-holders for each die-spindle, so that 80 when one set of notches or bolt-holders holding a bolt J is opposite the die-spindle, the other set of bolt-holders is at one side of the line of the die-spindle, as represented in Fig. 1; hence while one bolt J is being threaded, the 85 bolt-carriage may be fed with a new bolt, as at J', Fig. 1, and as soon as the bolt is threaded by the dies and they withdraw from it, the bolt-carriage may be moved laterally to remove the threaded bolt from the line of the 90 threading-dies and to present the new bolt in that line to be acted upon by the threading-dies without loss of time.

In order that the bolts may be presented to the dies and removed from them automatically 95 the bolt-carriage is moved to and fro by mechanism operating in concert with the mechanism for revolving the threading-dies.

The bolt-carriage mechanism for this purpose in the machine represented consists of 100 the following devices: The bolt-carriage M is connected by means of a link, k, with a pair of rocking arms, K K', which are secured to a rocking sleeve, K'', that rocks upon a long stud made fast to the frame of the machine, 105 and this sleeve is caused to rock at proper times by means of two cams, N N', that are secured to a cam-sleeve which is connected by gearing D'' D' with the cam-shaft F of the cams that advance and withdraw the threading-dies. The carriage-cam N operates upon a friction-wheel, n, pivoted to the rocking arm K. The other carriage-cam, N', operates upon a friction-wheel, n', pivoted to an arm, K', projecting from the rocking sleeve K'', hence 110 when the cam N' acts upon its friction-wheel n', the rocking sleeve and its arms are rocked to move the bolt-carriage from left to right in Fig. 3, and when the cam N operates upon its friction-wheel n, the rocking sleeve and its 115 arms are rocked to move the bolt-carriage in the reverse direction. The most protuberant part of the rim of each carriage-cam is circular, so that when it has moved the bolt-carriage it holds it in one direction, and the least protuberant part of each cam is also circular, so that it stops excessive movement of the bolt-carriage by momentum. The connection of the gearing between the carriage-cam sleeve and the threading-die cam-shaft F is such, 120 and the carriage-cams are so set, that the movement of the carriage in each direction 125

takes place in the short interval of time when the dies are open, and the distance to which the bolt-carriage is moved at each operation is the distance between the two sets of bolt-holders which operate in connection with one die-spindle, hence when the machine is in operation it results that if the carriage be in the position represented in Figs. 1 and 3 while the bolt *J* is being threaded, the next movement of the carriage removes the threaded bolt *J* in the direction of the arrow *l*, Fig. 1, to the position of the dotted line *J*², and presents the new bolt *J'* to the threading-dies; and while the new bolt is being threaded the previous bolt *J* may be removed or discharged from the bolt-carriage and a new one substituted in its place, to be in turn presented to the threading-dies when the carriage is moved in the reverse direction to that indicated by the arrow *l*.

In order that the threaded bolts may be discharged from the bolt-carriage, bolt-discharging devices are provided. In the machine represented, these consist of vibrating arms *P*, secured to a rock-shaft, *P'*, one of said dischargers being at each side of the line of each die-spindle *C* with its head in a position to force down the point of the threaded bolt when it is removed from the line of the die-spindle by the movement of the bolt-carriage. The depression of the point of the bolt tips it, raises its head, and enables it to fall from the bolt-carriage. The discharger rock-shaft *P'* is operated by a cam, *P*², which is secured to the cam shaft *F*, and operates upon the said rock-shaft through the intervention of the elbow-lever *p*, link-rod *p'*, and arm *p*², which last is secured to said rock-shaft. The cam depresses the heads of the bolt-dischargers, and they are restored to their positions when the cam projection has passed the end of the lever *p*, by a counter-weight, *p*³, secured to the arm *p*². A spring may of course be used for the same purpose.

When the above-described mechanism is in operation, the die-spindles with their dies revolve continuously. The bolts to be threaded are placed in these bolt-holders of the bolt-carriage, which are at the time at one side of the line of each die-spindle. While the dies are at or about their most backward positions, as in Fig. 6, the bolt-carriage is moved so as to present the bolts in the lines of the die-spindles. The dies are then advanced upon the points of the bolts and thread them. As the dies reach their most advanced position, they are opened by the movement of their shanks from the opening-hubs *h*, as previously described, and the dies are then regressed. While the threading is being effected, the attendant lays new bolts in the die-carriage, in those bolt-holders thereof which are at one side of the line of each die-spindle, and when the dies are next at or about their rearmost positions, the bolt-carriage is moved again to remove the threaded bolts from the

lines of the die-spindles and place the new bolts in those lines. The threaded bolts so removed to one side of the line of each die-spindle are tipped and discharged by the operation of their respective dischargers *P*, leaving the bolt-holders of the bolt-carriage free to be fed with new bolts which are threaded and discharged in their turn.

The machinery thus far described is sufficient to thread bolts of the same length. To enable it to be used for the threading of bolts of different lengths, the bolt-carriage is made adjustable relatively of the die-spindles. In the machine represented, this adjustability is attained by making the guides *R* of the bolt-carriage adjustable on the frame of the machine, their shanks being perforated with slots *r*, through which the securing-bolts are passed, so that when the securing-bolts are slackened the carriage-guides *R* may be moved to set the carriage nearer to or farther from the threading-dies when in their most advanced positions, and then the bolt-carriage may be maintained at its adjusted position by screwing up the bolts.

In order that the carriage may be moved properly in whatever position it may be adjusted in, the link *k* (which connects the bolt-carriage with the vibrating arms *K K'*) is fitted to slide upon the bar *s*, which connects the vibrating arms, so that when the bolt-carriage is adjusted its link *k* may also be adjusted to transmit the motion to the bolt-carriage.

Instead of adjusting the bolt-carriage for different lengths of bolts by setting the guides *R* separately and directly by hand, they may be moved simultaneously so as to keep the bolt-carriage parallel with itself during its movement. For this purpose each carriage-guide *R* has a rack, *R'*, secured to its under side, as shown in dotted lines in Fig. 7, and the teeth of each rack are engaged with those of a pinion, *R*², secured to a shaft, *R*³. By turning this shaft both ends of the carriage may be moved simultaneously and to the same extent. The bar *m*² also may be set closer to the bars *m m'* to suit bolts of shorter length than those represented in the drawings.

The mechanism for moving the bolt-carriage and for operating the dies may be greatly varied, and instead of constructing the bolt-carriage with notches as holders for the bolts, its bars may be fitted with projecting pins or forks as bolt-holders for the bolts.

The cams and their connections for moving the die-spindles, those for moving the bolt-carriage, and those for operating the dischargers, may be replaced by their mechanical substitutes, so as to vary the mechanism of the machine without changing substantially its mode of operation.

Parts of the invention may be used without others. Thus the mechanism which moves the bolt-carriage automatically may be removed, and the carriage may be moved by

hand or by a treadle at the proper intervals, a stop being used to determine the extent of movement in each direction. The bolt-dischargers may also be moved by hand or by a 5 treadle in the same manner.

While we do not recommend this mode of operating the bolt-carriage and the bolt-dischargers, yet much time may be saved by it as compared with the time required to feed a 10 bolt-threading machine without the use of a bolt-carriage fitted to move crosswise of the line of the die-spindle, and without the use of a bolt-discharger to discharge the bolt from the bolt-carriage.

15 If the bolts to be threaded have round necks and angular heads, as machine-bolts do, the bolt-carriage must be fitted with bolt-holders which will act upon the bolt-heads and keep them from turning, or with jaw bolt-holders 20 adapted to grasp and release the round stems of the bolts, as required, in the operation of the machine.

We claim as our invention—

1. The combination, substantially as before 25 set forth, of the revolving die-spindle with the movable carriage provided with two sets of bolt-holders for said spindle, and fitted to be moved in alternately opposite directions across the line of the die-spindle a distance 30 equal to the lateral space between the central lines of the bolt-holders, whereby each set of bolt-holders may be moved laterally in alternate succession opposite the die-spindle, and may be withdrawn therefrom in reverse 35 directions.

2. The combination, substantially as before set forth, of the revolving die-spindle, the movable bolt-carriage provided with two sets of bolt-holders for said spindle, and mechanism 40 by which said carriage is moved automatically and at intervals in alternately opposite directions across the line of the die-spindle a distance equal to the space between the central lines of said bolt-holders.

3. The combination, substantially as before 45 set forth, of the revolving die-spindle, the movable bolt-carriage provided with two sets of bolt-holders for said spindle and fitted to be moved in alternately opposite directions across the line of the die-spindle a distance 50 equal to the lateral distance between the central lines of said bolt-holders, and the bolt-discharger arranged at one side of said die-spindle for discharging a threaded bolt from said bolt-carriage.

4. The combination, substantially as before 55 set forth, of the revolving die-spindle, the bolt-carriage provided with two sets of bolt-holders for said die-spindle, mechanism by which 60 said carriage is moved automatically and at intervals in alternately opposite directions across the line of said die-spindle a distance equal to the space between the central lines of 65 said bolt-holders, the bolt-discharger arranged at one side of the line of the die-spindle, and mechanism for operating said discharger automatically.

5. The combination, substantially as before 70 set forth, of the revolving die-spindle, the bolt-carriage provided with two sets of bolt-holders for said spindle, and fitted to be moved in alternately opposite directions across the line of the die-spindle a distance equal to the lateral space between the central lines of 75 said bolt-holders, and the adjusting devices whereby the bolt-carriage is adjusted to present bolts of different lengths to the dies carried by the die-spindle.

In witness whereof we have hereto set our hands this 13th day of February, A. D. 1884.

JOHN BRUDERER.
ORRIN CLARK BURDICT.

Witnesses:

ISAAC HECHT,
PHILIP F. SNYDER.