(No Model.)

H. M. SMITH.

MACHINE FOR THREADING THRASHER CYLINDER TEETH.

No. 244,679. Patented July 19, 1881.

Fig. 1.

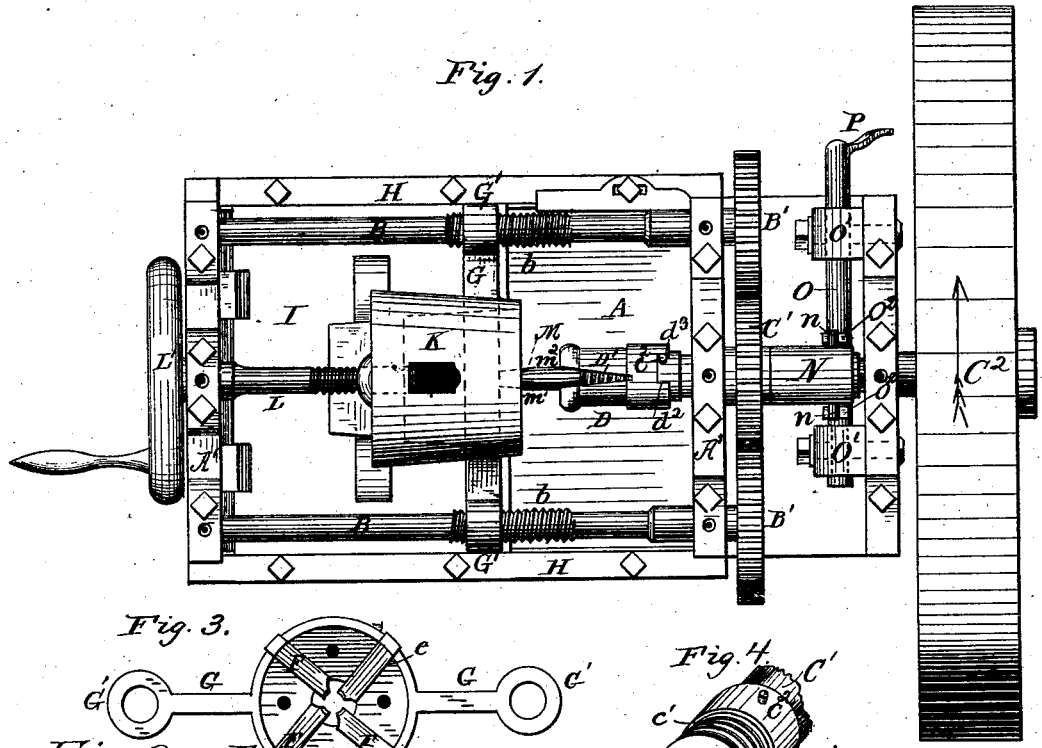


Fig. 3.

Fig. 6.

Fig. 4.

Fig. 2.

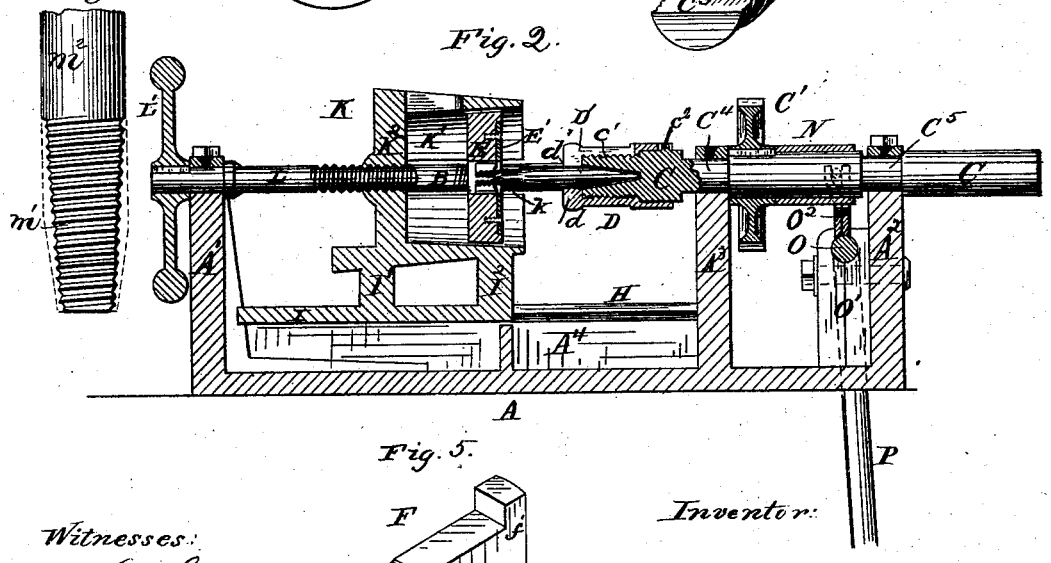
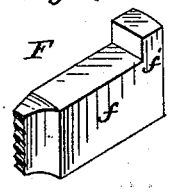


Fig. 5.



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HIRAM M. SMITH, OF RICHMOND, VIRGINIA.

MACHINE FOR THREADING THRASHER-CYLINDER TEETH.

SPECIFICATION forming part of Letters Patent No. 244,679, dated July 19, 1881.

Application filed June 25, 1880. (No model.)

To all whom it may concern:

Be it known that I, HIRAM M. SMITH, of Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Machines for Threading Thrashing-Cylinder Teeth; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a top-plan view of my improved machine for screw-threading the teeth for thrashing-cylinders. Fig. 2 is a central vertical longitudinal section of the same. Fig. 3 is a front elevation of the die-carrier detached. Fig. 4 is a perspective of the inner part of the chuck or tooth-holding device. Fig. 5 is a perspective of one of the dies detached. Fig. 6 is a portion of the tooth enlarged, showing by full and dotted lines the positions of a smaller and larger screw-thread.

The operative parts of the machine may be supported upon any suitable frame.

In the drawings I have shown a supporting-frame formed of a bed-plate, A, end standards, A′ A^2, an intermediate standard, A^3, and side sills, A^4, preferably cast in one piece of metal.

B B represent shafts, each mounted at one end on the standard A′, and at the other end on the standard A^3. Each of these shafts is screw-threaded near the center, as at *b*, for a suitable distance, and projects beyond the standard A^3. B′ B′ are spur-pinions secured to the projecting ends of the shafts.

C is a shaft mounted on standards A^2 A^3 in suitable bearings on a line substantially equidistant from shafts B B.

C′ is a spur-wheel attached to shaft C, and arranged to engage with the pinions B′ B′ and rotate the shafts B B in the same direction.

A band-wheel, C^2, is keyed to the shaft C outside of the standard A^2, for communicating power.

At the inner end, *c*′, a screw-thread is formed on the shaft C.

C^3 is a recess, substantially V-shaped, extending inwardly from the end of the shaft C, for a purpose to be described.

D is a sleeve fitting over the inner end of shaft C, and internally threaded to engage with the threaded part *c*′. It is formed with a flange, *d*, projecting inwardly over the end of the shaft, except at the center, where there is an aperture, *d*′.

D′ is a V-shaped aperture in the side of the sleeve, corresponding in position and size to recess C^3, and communicating with the central aperture, *d*′.

c^2 is a pin projecting from shaft C, and the rear end of sleeve D is cut away to form shoulders d^2 d^3, whereby the sleeve, when in position, engages with said pin, which limits the movement of the sleeve around the shaft. When the shoulder d^2 is in contact with the pin c^2 the aperture D′ coincides with recess C^3 and permits access to the interior of said recess. When shoulder d^3 is against the pin the recess is closed, except at the aperture *d*′.

E represents the die-carrier. Preferably it is circular in outline and formed of a thick strong metallic plate. It is provided with radial grooves *e* upon the outer face.

E′ is a circular plate, to be bolted against the outer face of the carrier E to cover the open sides of the grooves *e*, there being a shallow annular seat for said plate, as shown in Figs. 2 and 3.

F F are the dies for cutting the screw-thread on the thrashing-tooth. They are constructed with a shank or body, *f*, an enlarged head, *f*′, and with cutting-edges at the inner end. They are of a size suitable to fit the grooves *e* in the carrier E and to slide longitudinally therein. The heads *f*′, by striking the edge of plate E′, serve as stops to the inward movement of the dies. The dies can be readily removed, if desired, for any purpose, and the carrier can be cleaned after removing the plate E.

G G are arms projecting laterally from the die-carrier, and having at their outer ends internally screw-threaded collars G′, adapted to engage with the threads *b* on shafts B B. When these shafts are rotated by the wheels C′ B′ in one direction the die-carrier is drawn toward the shaft C, and when they are rotated in the opposite direction it is carried away from said shaft.

H H are ways formed upon or secured to the sills A^4. Upon these ways is supported a frame or carriage formed of a bottom plate, I,

and standards I′ I². The guide K for the dies F is carried by this sliding frame, to which it may be firmly bolted, or with which it may be cast.

K′ is a chamber within the guide, which is substantially of the form of a frustum of a cone, the diameter enlarging toward the shaft C.

L is a screw-shaft engaging with the rear wall, K², of the guide and carrying a hand-wheel, L′, whereby the guide can be reciprocated upon the ways H H. There are slots *k* cut in the lateral walls of the conical chamber in the guide, so that it can be reciprocated without interfering with the arms G G, that support the die-carrier.

The object of this invention is to provide a thread upon a tapered thrasher-tooth. The tooth, before being threaded, is flattened at one end, and is tapered by means of a lathe at the opposite end, there being a cylindrical portion at the center of the tooth.

The method of operation of the machine which I have described above is as follows: The sleeve D is turned sufficiently to bring the aperture D′ opposite the recess C³. The tooth M is then inserted by passing the flattened end *m* sidewise into the recess C³, the cylindrical part projecting through the aperture *d*′, after which the sleeve is turned sufficiently to close the side of the recess in the shaft, and the tooth is held firmly in the position shown in Fig. 2. Power is then transmitted to the mechanism through the band-wheel C², by which the shaft C is rotated in one direction, and the shafts B B in the direction opposite thereto. When the band-wheel C² and shaft C are rotated in the direction of the arrow the carrier E and the dies F are drawn toward the shaft C and toward the tooth M secured thereto.

I have devised a mechanism by which to avoid all longitudinal pressure or endwise thrust upon the tooth after the dies have begun to cut the thread, but which shall permit such endwise pressure to be applied to the tooth at the instant the dies come in contact with the tooth and begin to cut, in order to prevent the thread from being interfered with by backlash of the gearing, or by any lost motion of the carrier or movements of the tooth or tooth-holder.

The shaft C is cut away to form thin portions C⁴ C⁵, to fit the bearings. These portions C⁴ C⁵ are of a length somewhat (preferably about an eighth of an inch) greater than the width of the bearings, so that the shaft C, with the mandrel or tooth-holder and the tooth, can be moved longitudinally.

N is a sleeve loosely fitting the shaft C, between the standard A² and the spur-wheel C′. This sleeve is somewhat shorter than the distance between said standard and wheel, so that it can move longitudinally with shaft C to a limited extent.

nn are pins projecting laterally from sleeve N.

O is a rock-shaft mounted beneath the shaft C in bearings O′. O² O² are arms attached to rock-shaft O and arranged to engage at their upper ends with the pins *n*.

P is a hand-lever attached to the outer end of rock-shaft O, and by means of said lever and rock-shaft the shaft C can be thrust inward.

When the dies have advanced nearly to the tapered end of the tooth the operator, with his hand or knee, thrusts the shaft C and the tooth M toward the dies, and holds the tooth tightly against them until they have engaged with the tooth. After they have begun to cut the thread the lever is dropped and the tooth automatically adjusts itself to the dies. As the carrier E is drawn forward the dies F are permitted by the conical wall K of the guide to move gradually away from the axis of the tooth M, such movement being caused by the resistance of the metal of the tooth. Thus, as will be readily seen, the cutting-edges of the dies tend to follow paths diverging relative to each other. The thread is carried to the inner end of the tapered part *m*′ of the tooth M, at which point the motion of the parts is reversed.

As the construction described gives plenty of play to the mandrel or tooth holder there is no danger of marring the newly-formed thread by the dies, as they retreat after the motion is reversed.

During the thread-cutting operation the guide K is left stationary, (after being properly adjusted,) so that the threads on the several teeth shall be similar.

Sometimes it is desirable to cut a thread on a blank of larger diameter than that ordinarily formed. For this purpose the tooth (prior to the thread-cutting) is by the lathe or otherwise provided with a thicker tapered part, and the guide K is adjusted so that the carrier shall move in a wider part of the core, which allows the cutting of a thread on a blank of greater diameter. (See dotted lines in Fig. 6.) The cylindrical part of the tooth is, however, of the same diameter in all cases.

Teeth of the character last described are well adapted for replacing teeth of thinner taper, which (owing to looseness) have been withdrawn from a cylinder, as they can be inserted in the same aperture, and will engage firmly, on account of the greater diameter of the thread.

The thrashing-cylinder teeth, thus completed by the mechanism above described, are made of unbent cylindrical pieces of iron or steel. At the outer end the metal is flattened out, there being formed two opposite diverging faces extending to the outer end of the piece of metal, and with a tapered inner end, *m*′, as shown in Figs. 1 and 6, which is provided with the thread above described. Between the outer end of the tapering screw-thread and the inner ends of the flat faces there is provided an extended central cylindrical portion, *m*². The teeth are secured in the wooden part of the thrashing-cylinder by screwing them inwardly until the inner ends of the flattened faces *m*³ reach the surface of the cylinder. The threaded part of the tooth is thus sunk to a point con-

siderably below the surface, and the danger of breaking the tooth where its surface is cut in forming the thread is avoided. Great numbers of those teeth whose threads lie at or near the surface of the cylinder are broken at the extremity of the thread, as is well known.

What I claim is—

1. The combination, with the threaded shafts B B, the die-carrier E, and the longitudinally-sliding dies F, of the movable guide K, having the interior conical chamber, K′, substantially as set forth.

2. The combination of the sliding guide K, having the interior conical chamber, K′, the carrier E, the sliding dies F, and the screw-shaft L, substantially as set forth.

3. The combination, with the sliding guide K, of the carrier E, situated within said guide, and moving independently thereof, the arms G, and the threaded shafts B, substantially as set forth.

4. The combination, with the shaft C, provided with the V-shaped recess C^3, and the pin c^2, of the sleeve D, having the aperture D′, the flange d, and the shoulders d^2 d^3, arranged to prevent a complete rotation of the sleeve D, substantially as set forth.

5. The combination, with the dies F, and mechanism, substantially such as described, to advance said dies during the time they are operating, of the shaft C, which is cut away to form the thin portions C^4 C^5 longer than the bearings of the shaft, and which is arranged to slide without resistance to a limited extent in both directions, substantially as and for the purposes set forth.

6. The combination, with the dies F, mechanism, substantially such as described, to advance said dies while they are operating, and the shaft C, arranged to move to a limited extent without resistance in either direction, of the sleeve N and rock-shaft O, as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 14th day of June, 1880.

HIRAM MOORE SMITH.

Witnesses:

C. M. SMITH,

J. T. SMITH.