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C. WINSSINGER.

PROCESS OF AND MACHINE FOR ROLLING SCREW THREADS.

No. 550,560. Patented Nov. 26, 1895.

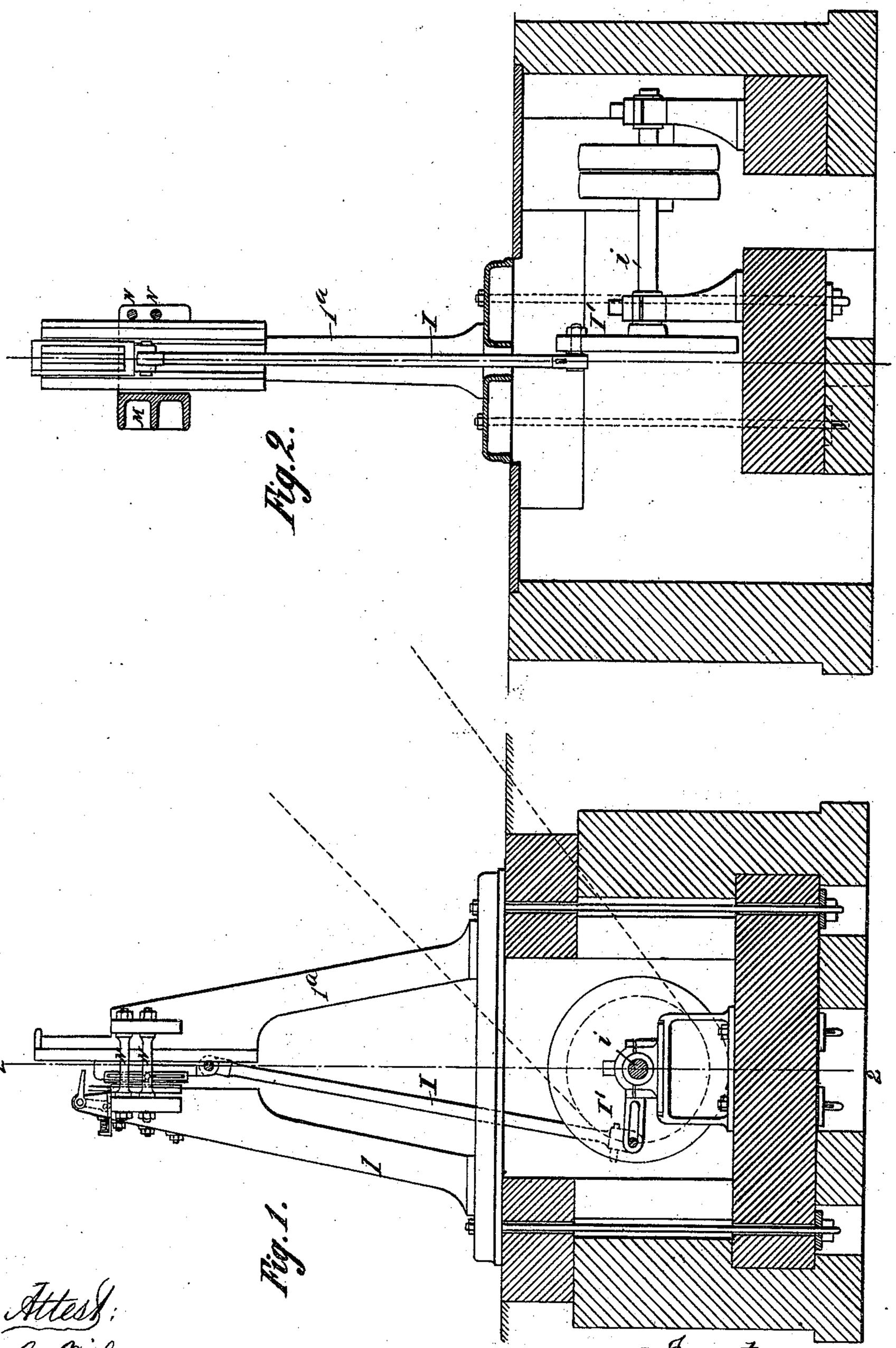

Fig. 2.

Fig. 1.

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C. WINSSINGER.

PROCESS OF AND MACHINE FOR ROLLING SCREW THREADS.

No. 550,550. Patented Nov. 26, 1895.

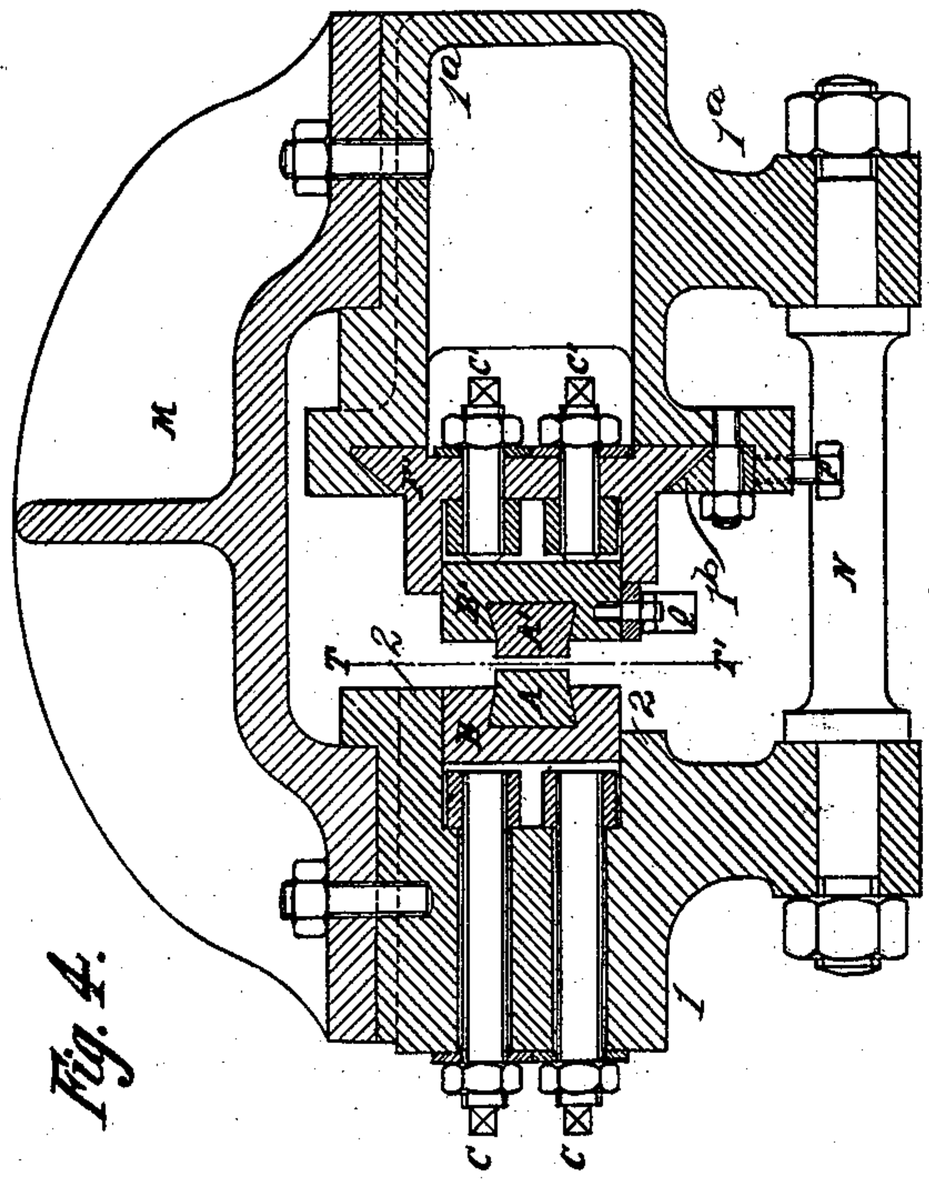

Fig. 4.

Fig. 3.

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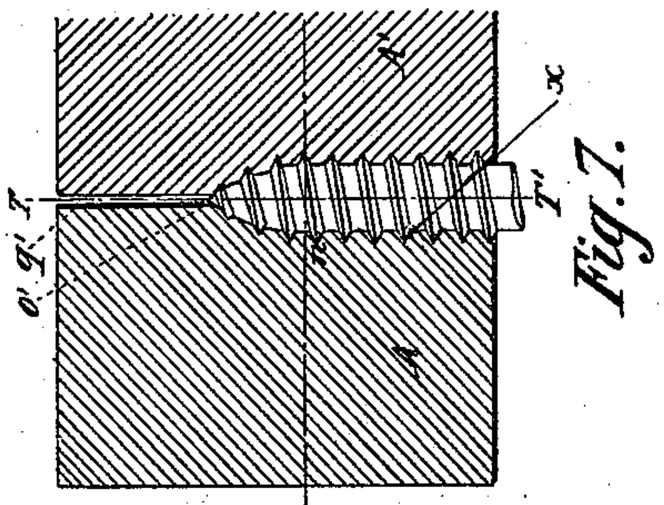

Fig. 7.

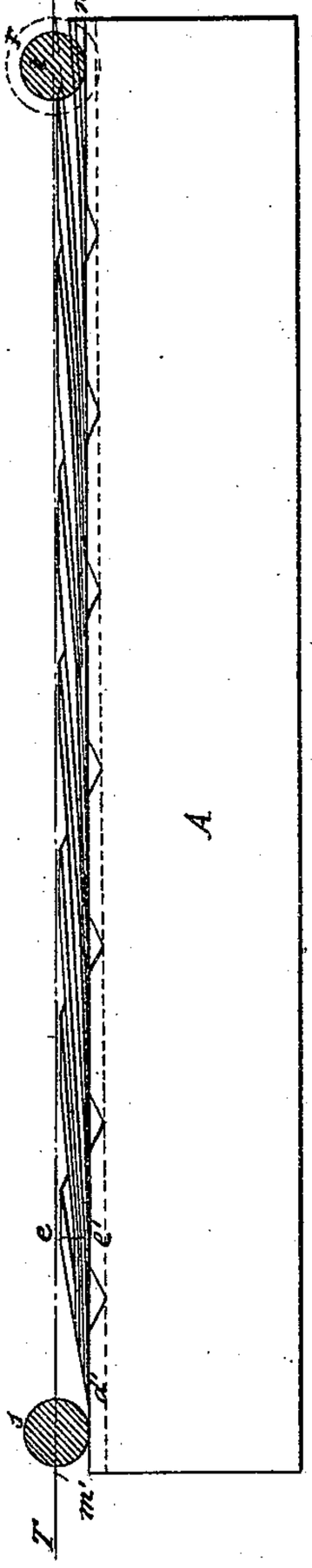

Fig. 8.

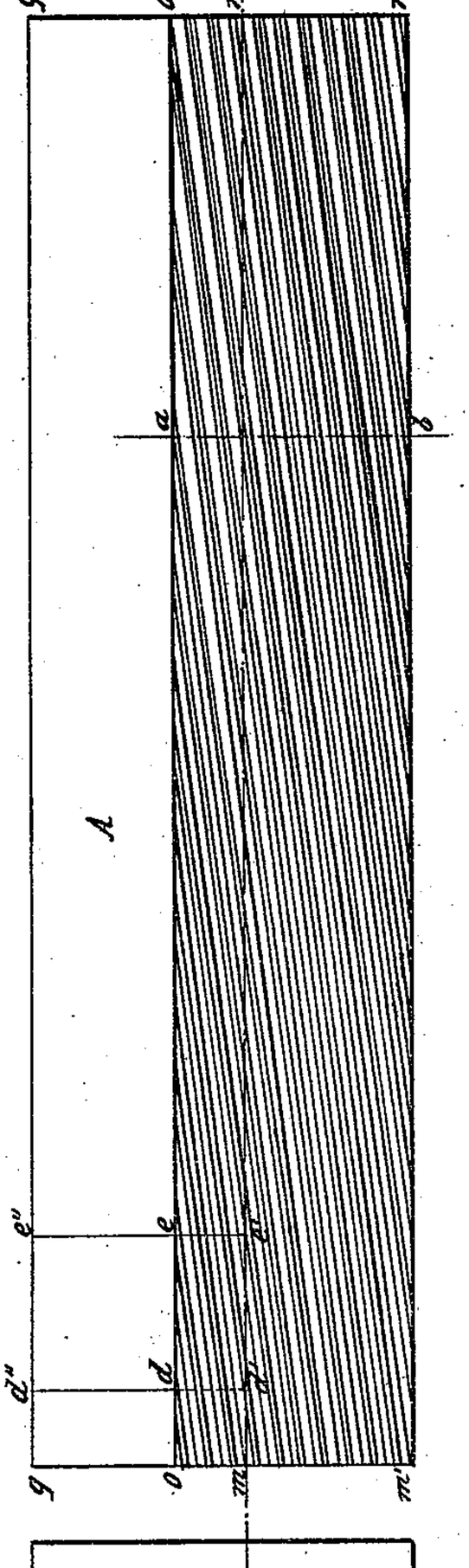

Fig. 5.

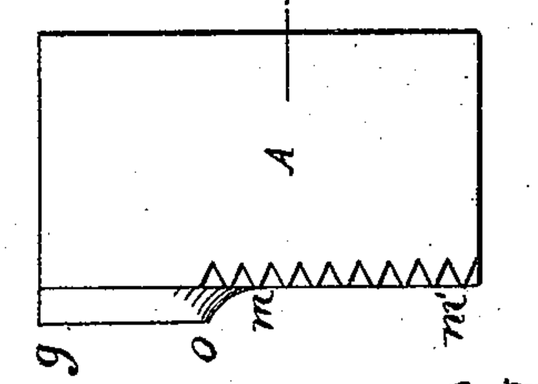

Fig. 6.

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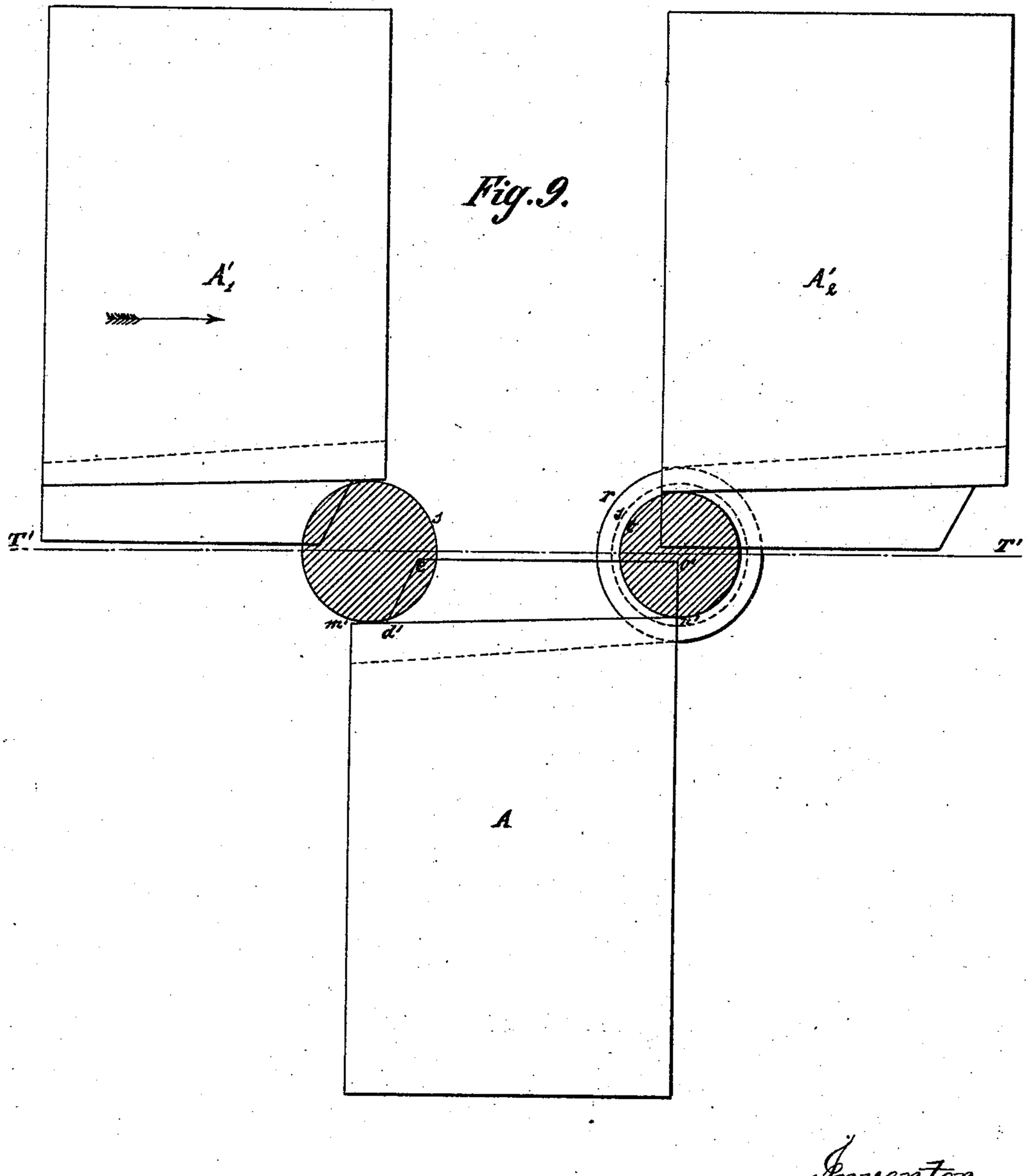
Fig. 9.



Attest:
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UNITED STATES PATENT OFFICE.

CAMILLE WINSSINGER, OF BRUSSELS, BELGIUM, ASSIGNOR TO NETTLEFOLDS, LIMITED, OF BIRMINGHAM, ENGLAND.

PROCESS OF AND MACHINE FOR ROLLING SCREW-THREADS.

SPECIFICATION forming part of Letters Patent No. 550,550, dated November 26, 1895.

Application filed April 30, 1886. Serial No. 200,714. (No model.) Patented in Belgium April 8, 1886, No. 53,655; in France April 30, 1886, No. 175,839; in England April 30, 1886, No. 5,872, and in Germany May 1, 1886, No. 38,495.

To all whom it may concern:

Be it known that I, CAMILLE WINSSINGER, engineer, residing at Brussels, in the Kingdom of Belgium, have invented a new and useful Process of and Machine for Rolling Screw-Threads, (for which patents have been obtained in Belgium April 8, 1886, No. 53,655; in France April 30, 1886, No. 175,839; in England April 30, 1886, No. 5,872, and in Germany May 1, 1886, No. 38,495,) of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the complete machine on a small scale. Fig. 2 is a sectional elevation on the same scale, showing the working face of the movable screw-plate, the frame being shown in section on the line 2 2, Fig. 1. Fig. 3 is an enlarged vertical section of the upper part of the machine, the plane of the section being at right angles to the working faces of the screw-plates. Fig. 4 is a horizontal section thereof. Fig. 5 is a plan or face view of one of the screw-plates. Fig. 6 is an end elevation thereof. Fig. 7 is a transverse section of a pair of screw-plates with a finished screw shown in elevation between them, the plates being in the position which they occupy at the moment when the threaded screw is about to fall. Fig. 8 is a side elevation of the screw-plate shown in plan in Fig. 5. Fig. 9 is an enlarged detail view of the screw-plates hereinafter more specifically referred to.

This invention relates to that class of machines which effect quite automatically the formation of the threads of wood-screws, metal screws, bolts, &c.—in fact, the formation of threads upon any cylindrical metallic blank by simply subjecting the said blank to the action of a pair of screw-plates, one of which is fixed, while the other has imparted to it a reciprocating rectilinear motion, said plates being provided with inclined grooves of any profile the counterpart of which it is desired to produce upon the blank.

In the drawings, 1 1^a represent the standards of the machine, which are securely bolted at bottom to the foundation and connected near the top on one side by a heavy beam M and on the other by stay-bolts N.

A represents the fixed screw-plate, which is dovetailed into a plate B, secured to the member 1 of the frame by means of a draw-bolt E. The plate is held against lateral displacement sidewise by fixed flanges 2, projecting from the standard 1, and from vertical displacement by a boss or enlargement formed on its back and fitting in a cavity in the frame. (Shown at 3 in Fig. 3.)

C represents four screws, which are tapped directly into the standard 1 or into nuts fitted in sockets therein and bear against the back of the plate B near its respective corners, whereby its face may be adjusted to any desired plane and there securely held against displacement.

A′ represents the movable screw-plate, which is dovetailed into a plate B′, secured by a central draw-bolt E′ to a box F′, four screws C′ being tapped into said box or into nuts secured in sockets therein for adjusting the face of the plate A′ to any desired plane and there securing it by bearing against the respective corners of the plate B′, all in a manner similar to that already described with reference to the plate A. Upon each side of the box, near the back, is formed a flange, which extends from end to end thereof, said flanges being beveled off on one side, so that the two together form a dovetail, the standard 1^a being formed with corresponding undercut grooves, in which said dovetail fits. One of these grooves is formed directly in the standard, while the other is formed by bolting to a flange or shoulder thereon a strip 1^b of metal, one of whose sides is formed with the bevel necessary to constitute in connection with said shoulder the groove of the desired shape. This strip 1^b is secured so as to be capable of movement toward and from the flange of the box which it overhangs, so that any wear may be compensated for, the adjustment being accomplished by means of set-screws P, tapped into the standard.

Motion is imparted to the box F′ by means of a pitman I, whose lower end is connected to a wrist-pin carried by the crank arm or disk I′ of a shaft *i*, which may be driven in any suitable or convenient manner. The travel of the screw-plate should vary according to its

own length, the length and diameter of the blank to be threaded, the hardness of the metal to be operated upon, the depth of the thread to be produced, &c., and to accomplish this it is simply necessary to vary the distance between the axis of the driving-shaft *i* and the point of connection between the pitman and the arm or disk I′. To this end the wrist to which the pitman connects is fitted in a radial slot and is held at any desired place by means of a suitable jam-nut.

The blanks to be operated upon are conveyed to the machine by means of a chute K and delivered upon the upper inclined edge of the fixed screw-plate A.

L represents a reciprocating feeder resting upon the top of the standard, which is inclined in the same plane with the top of the plate A. The feeder L is held normally in the retracted position shown in Fig. 3 by means of a spring J and is moved forward, carrying before it a blank, just as the movable screw-plate completes its upward stroke by means of an arm G, projecting from a rock-shaft, which shaft receives its motion through another arm H, which is engaged by a stud or boss Q, projecting from the side of the plate B′ or other moving part. The blank being once lodged in the crevice between the upper cover of the fixed plate A and the face of the movable plate A′ will be carried downward between them by the descent of the latter.

Screw-plates.—The two screw-plates are perfectly identical. Figs. 5, 6, 7, and 8 show the details of a screw-plate for forming wood-screws with gimlet-point. Fig. 5 shows a screw plate in plan, and Fig. 6 an elevation of the outer left face turned down toward the left. Fig. 7 gives a section through the pair of screw-plates at the moment when the threaded screw, which they are pressing between them, is about to fall. Fig. 8 shows an elevation of the screw-plate A as seen on the side of its greatest width. Each of the two similar screw-plates is provided with straight grooves, making the same angle with the edge *m m′* as the screw-thread to be produced does with its axis. In other words, the grooves are parallel with the line that would be obtained by developing on the plane *m m′ n n′* the helix of the same pitch as the screw-thread described by a point *x*, Fig. 7, in the body of the finished screw. The screw-plates are by no means parallel and have a very irregular shape. To give a correct idea of their form and of their motion with respect to each other, the position of the lines may be referred to an auxiliary plane T T′, Figs. 3, 4, 7, 8, and 9, made by the axis of the screw during its rotation. This plane is parallel with the edges of the flanges of the box F′. The surface *m m′ n n′*, Fig. 5, is a plane not parallel with T T′, but approaching it from *m m′* to *n n′*. It is in this surface that the grooves are formed. The axis of the screw remains parallel with the plane *m m′ n n′* while it is being threaded. The portion *e e″ o′ g′* is plane and parallel with T T′, but has no grooves. The surface *o m o′ n* is curved, and in it are the hollow prolongations of the grooves of the surface *m m′ n n′*. The surface *o m o′ n* serves to form the thread at the screw-point. That portion of the surface *g d″ d d′ m o* is a plane and a prolongation of the plane *m m′ n n′*. The portion of surface *d″ e″ e d* is an incline plane, which descends from the plane *e e″ g′ o′* to the plane *g d″ d o*. Lastly, the surface *d e d′ e′* is a curved surface connecting the lines *d e e e′* with the plane *m m′ n n′*. Fig. 9 shows by their main lines the screw-plates A A′, of which A is fixed and A′ capable of moving from the position A′ to that of A′². In order to show clearly the irregular shape of the screw-plates, I have in this figure reduced to one-tenth the dimensions which are parallel with the arrow—that is to say, with the lengths of the screw-plates—while preserving without alteration the dimensions perpendicular to the former. The dimensions of the circles have not been altered in any way. This conventional drawing, Fig. 9, makes very apparent the irregularities above described. The grooves of the screw-plates vary in width and in depth, except from *a b* to *o′ n′*, where they are both in constant section, which section, as shown in the drawings, is **V** shape. The hollows deepen from *a b* to *o′ m′*, while, on the contrary, the projections increase in width from *o m′* to *a b*. Each screw travels along the plate from *o m′* to *o′ n′*.

The screw-plates A and A′ are identically the same as stated above; but they are placed in inverse directions. While being threaded, therefore, the screw receives the impression of ribs, which penetrate to a constantly-increasing depth, while they also become more and more widened out. It follows that the screw-thread is progressively reduced in thickness and extended in radial depths at the same time. From *a b* to *o′ n′* the profile of the screw is no longer modified, this last distance to be traversed only giving a supplementary polishing. The circumference *s* is that of the original shank before being rolled. The circumference *t* is that of the main body of the screw as completely threaded. The circumference *r* is the apparent external contour of the thread as existing on the body of the finished screw.

The screw-plates for metal screws, bolts, or cylindrical shanks only differ from those of wood-screws in the suppression of the projecting portions *m o o′ m*, which are only necessary for screwing the points of wood-screws.

I am aware that revolving dies for rolling screws have before been made with ribs of gradually-increasing thickness, so as to act laterally upon the metal confined between them; also that flat dies for rolling threads on screws are not broadly new.

I am aware that many years prior to my application it was proposed to roll threads on

screws by means of flat dies having indenting-ridges and corresponding in profile with the screw to be produced. This is referred to in the patent of Edward Croft, No. 142,560, dated September 9, 1873, the particular improvement in which consists in forming the dies with diverging ridges, so that the blank may be permitted to elongate under the rolling operation. The screw-threads are thus made of gradually-increasing pitch as the rolling progresses; but in order to leave the finished screw with a thread symmetrical on all sides it is proposed in said Croft patent to form the indenting-ribs at the discharge ends of the dies parallel or of uniform pitch for a length corresponding with the perimeter of the screw. The indenting-ridges are, however, made of gradually-increasing thickness from end to end, so that the swaging action is continued until the screw is discharged. My improvement differs in the above in that I form the die-plates with indenting-ridges increasing in thickness from the forward end for some distance in order to swage the screw-thread and extend it in lateral depth, as stated, and from thence to the discharge end of equal thickness, so that after the swaging is finished and the thread formed of its full depth it may be subjected to a final polishing action without further increase of its radial depth.

I am aware that flat dies for rolling screws having oblique ridges which gradually penetrate the metal and at the discharging end are of uniform pitch for a length equal to the perimeter of the screw are not broadly new.

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

1. The process of rolling screws which consists in introducing a blank approximately corresponding in length with the desired screw, between a pair of flat dies formed with oblique V-shaped ribs longitudinally parallel as to their center lines, expanding progressively in thickness through a portion of their length, and thence of uniform thickness to the end; moving one of said dies over the other so as to roll the blank between them in such manner as to cause the gradual penetration of the ribs and progressive lateral compression and radial extension of the metal between them until the desired screw thread is completely evolved and compressed in symmetrical form without material elongation of the screw, all as herein explained.

2. A pair of flat dies or rolling threads on screws having working faces corresponding transversely with the longitudinal form or profile to be imparted to the threaded portion of the screw, said working faces being formed with oblique V-shaped grooves and between these a series of bars or lands having their centers longitudinally parallel, adapted to penetrate the blank to a gradually increasing depth and being narrow at the end where they begin to form the thread and increasing in width toward the other end so that they will act laterally on the metal between them and force it radially into the grooves which thus form the thread as explained.

3. A pair of flat dies for rolling screws formed with gradually penetrating and gradually expanding oblique ribs, having their centers longitudinally parallel as herein shown and described.

4. A pair of flat dies for rolling screws, formed with gradually penetrating ribs, longitudinally parallel as to their center lines, gradually increasing in width from the initiative end of the plate through a portion of their length and thence of uniform width to the end, substantially as and for the purposes set forth.

5. In a screw-threading machine the combination with the frame and a screw-plate substantially as described, of a draw-bolt for securing said plate to the frame, and four set-screws situated behind the respective corners of the plate for adjusting it, substantially as set forth.

6. The combination with the plate A supported in vertical plane and the feed chute at the upper edge of said plate, of the reciprocating feeder, the reciprocating plate A′ and connection between said reciprocating plate and feeder, substantially as set forth.

7. The combination with the frame and the plate A fixed thereto, of the feed chute terminating at the top-edge of said plate, the feeder L mounted to slide upon the top side of said frame and plate A, the spring J for holding said feeder in retracted position, the rock-shaft having arms G, H, and the reciprocating plate A′, substantially as and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CAMILLE WINSSINGER.

Witnesses:
EMILE PICARD,
AUG. JOERISSEN.