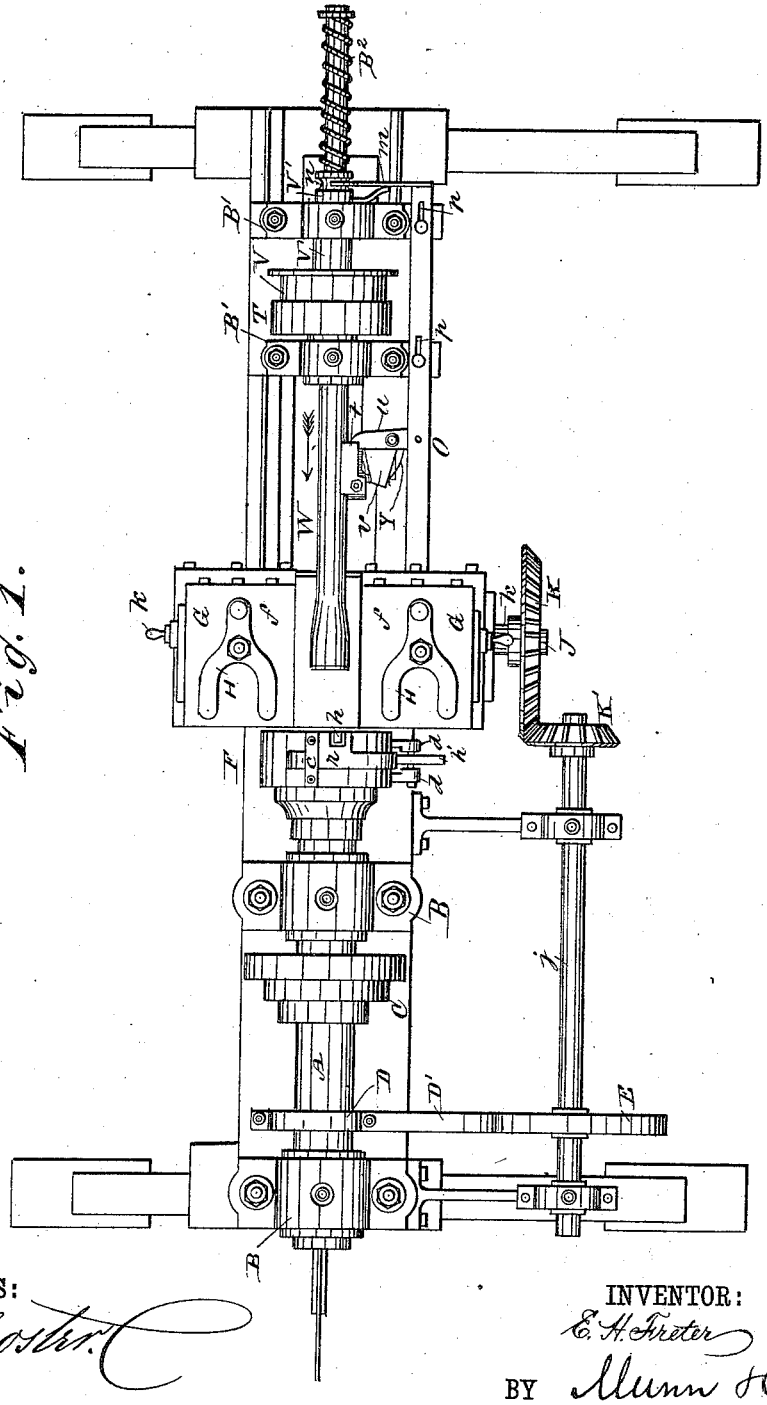
(No Model.) 3 Sheets—Sheet 1.

E. H. FRETER.

SCREW CUTTING MACHINE.

No. 309,140. Patented Dec. 9, 1884.

Fig. 1.



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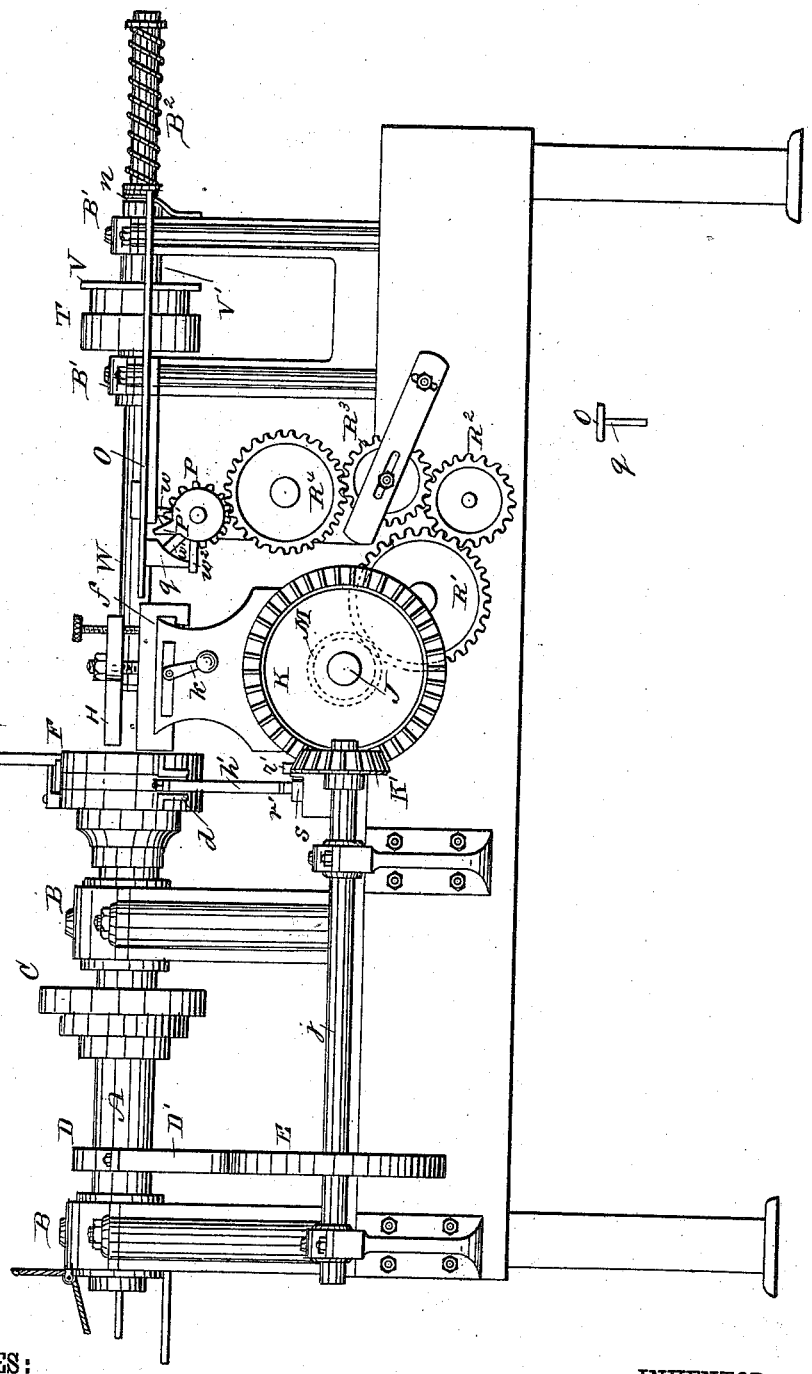

Fig. 2.

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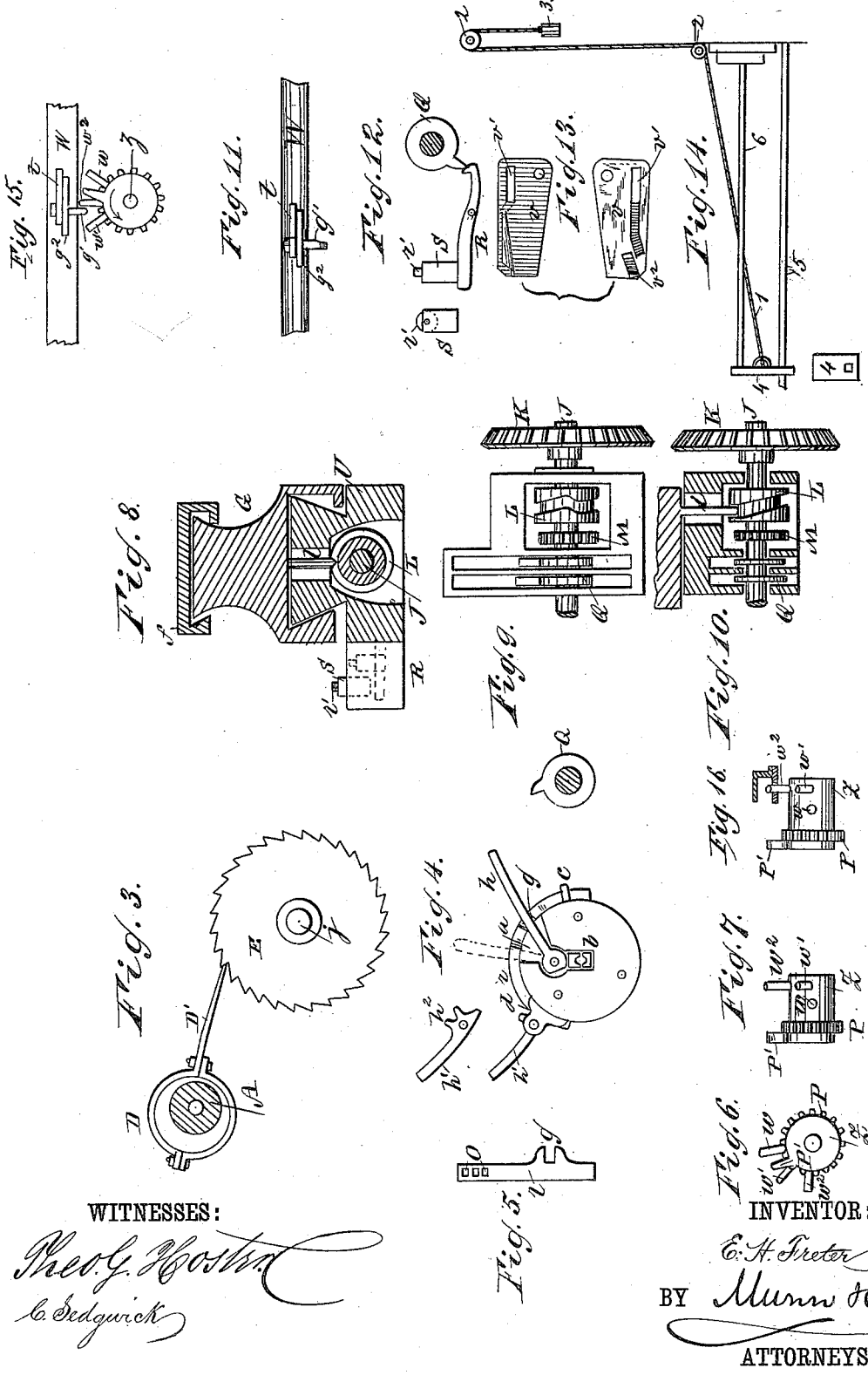

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UNITED STATES PATENT OFFICE.

EDUARD HEINRICH FRETER, OF ROEDELHEIM, NEAR FRANKFORT-ON-THE-MAIN, GERMANY.

SCREW-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 309,140, dated December 9, 1884.

Application filed July 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDUARD HEINRICH FRETER, of Roedelheim, near Frankfort-on-the-Main, Germany, have invented new and useful Improvements in Screw-Cutting Machines, of which the following is a specification.

This invention relates to a machine especially adapted for cutting screws.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of my improved machine. Fig. 2 is a longitudinal elevation of the same. Fig. 3 is a detail side view of the ratchet-wheel and eccentric pawl for operating the clutch devices. Fig. 4 is a detail face view of the chuck. Fig. 5 is a plan view of the sliding strips on the same. Fig. 6 is a face view of the cam for operating the die-holder. Fig. 7 is a side view of the same. Fig. 8 is a cross-sectional elevation of the saddle and tool-rest. Fig. 9 is a plan view of the under side of the same. Fig. 10 is a longitudinal sectional elevation of the same. Fig. 11 is a detail side view of the lug on the die-spindle. Fig. 12 is a detail side view of the mechanism of the device for operating the gripping mechanism of the chuck. Fig. 13 is a plan and inverted plan of one of the catches for locking the spindle. Fig. 14 is a detail view of the weight-and-pulley feed for the wire. Fig. 15 is a detail view of the lug on the die-spindle and the armed cam-shaft. Fig. 16 is a detail view of armed cam-shaft and the pivoted leaf-shaped latch.

The hollow spindle A rests on the bearing-blocks B, and forms a hollow head-stock which can be revolved by means of belts passed around the stepped or cone-shaped pulley C, or directly from a motor. The eccentric disk D, mounted on the spindle A, terminates in a pawl, D′, engaging with a ratchet-wheel, E, mounted on a spindle, *j*, journaled parallel with the spindle A in arms of the machine-frame, so that the wheel E will be moved the distance of one tooth for every revolution of the spindle A. On the inner end of the spindle the chuck F is secured, which is shown in Figs. 4 and 5, the face-plate being removed, which face-plate has a central aperture through which the wire can be passed. A lever, *h*, is pivoted in a recess in the chuck, the recess being of such depth that the surface of the lever *h* will be flush with the face or end of the chuck-block. At its pivoted end the lever *h* is enlarged to form a boss, having part of its edge flattened. When the flattened part of the boss is over the sliding jaws *b b*, held in the chuck, the latter can be separated. When the rounded part of the boss is over the jaws, the upper jaw will be pressed downward and the jaws will grip the wire between them. A lever, *h′*, which is pivoted between lugs *d*, projecting from the rim of the chuck, is provided at its pivoted end with a toothed segment, h^2. A half-ring, *r*, is held to slide on the rim of the chuck by the lugs *d* and a keeper, *c*, which half-ring is provided at one part with a laterally-projecting fork, *g*, and at one end with a series of apertures, *o*, or with teeth with which the teeth of the toothed segment h^2 can engage, so that if the lever *h′* is swung the half-ring *r* will be moved in the direction of its length on the rim of the chuck, to operate the lever *h* and thereby the sliding jaws *b*. The tools are to be secured under the holders H, fastened on a slide-rest, G, the upper part, *f*, of which can be moved by means of a handle, *k*, and the entire slide-rest is movable transversely to the longitudinal axis of the lathe on the dovetailed saddle U.

On a shaft, J, journaled in the saddle U, a bevel cog-wheel, K, a grooved cam-sleeve, L, and the cog-wheel M are rigidly mounted.

From the bottom of the slide-rest G a pin, *l*, projects into a groove of the cam L, so that a revolution of the latter causes the saddle to be moved transversely, according to the shape of the cam-groove. The cog-wheel M engages with a cog-wheel, R′, and the motion of the latter is transmitted to the cog-wheels R^2, R^3, R^4, and P, the wheels R′ R^2 R^3 being mounted to revolve on pivots projecting from the lathe-bed, and the wheels R^4 and P being mounted on pivots projecting from the second adjustable head-stock, B′, as clearly shown in Fig. 2. When a revolution of the spindle A effects, by means of the pawl D′, a partial revolution of the ratchet-wheel E and shaft *j*, the motion is transmitted by the bevel cog-wheel K′, mounted on the shaft *j*, to the bevel cog-wheel

K, and to the wheel P, provided with the cam P′, and the short shaft Z, having pins *w*, *w′*, and w^2, for operating the sliding bar O and the die-spindle W, hereinafter described. On the shaft J are mounted two cams, Q, which, when rotated, press upon two levers, R, pivoted to swing, and thus adapted to lift the pieces S, held to move up and down in the saddle U. The pieces S are provided with small friction-rollers *r* at their upper ends, and as soon as the pressure from the lever R or the cams Q, respectively, decreases, the pieces S are pressed down by suitable springs. (Not shown.) When one or the other of the pieces S is lifted by its lever R, resistance is offered to the lever *h* or *h′*, respectively, which rotates with the chuck F, whereby the chuck is either closed or opened to grasp or release the wire—that is, it is closed when the lever *h* strikes against a piece, S; but when the lever *h′* finds the resistance, the chuck is opened as the half-ring *r* is moved by the lever *h′*, and the lever *h*, being between the prongs of the fork *g* of the ring *r*, is also moved, so that the pressure exerted by the lever *h* upon the jaws *b b* is taken off and the jaws are released. The chuck is opened to allow of the wire being pushed through it as soon as a screw is threaded and cut off, and is closed as soon as sufficient length of material has been passed through it for the next screw. The screw-cutting dies are in the spindle W, which rests on the second head-block, B′ B′, and is pulled forward in the direction of the arrow, Fig. 1, by the screw-cutting dies it carries in proportion as they cut the thread on the screw being made. The forward movement of the said spindle compresses the spring B^2, which serves to draw the spindle back to its original position as soon as the reverse motion imparted to the spindle from the pulley T has unscrewed the screw-dies from the finished screw. The pulley T is mounted loosely on the said head-block B′ B′, but is not movable endwise thereon.

On the spindle W a pulley or friction-disk, V, provided with a sleeve, V′, is mounted, which pulley is movable endwise, but is not free to turn on the spindle. The sleeve V′ is provided with an annular groove, *n*, into which the shanks of a fork, *m*, pass, which is fixed to a parallel rod, O, adapted to be moved to and fro longitudinally on a suitable rest, and is guided by slots *p p*.

From the under side of the rod O a lug, *q*, projects.

From the die-spindle W a lug, *t*, projects, which lug is provided with the projection *g′*. To the said lug *t* the slotted plate g^2 is adjustably secured.

u v are catches pivoted to a fixed support, and engaging the lug *t* and plate g^2 of the spindle W, respectively, when the said spindle is in its normal position. The catch *u* is also pivoted to the rod O, so that the said catch, when the rod O is pushed from right to left, will be moved away from under the lug *t*. The catch *v* is provided with the curved slot *v′*, to receive the pin *w* of the shaft Z, and a projection, v^2, to be engaged by said pin, for a purpose hereinafter described. The catch is also provided with a flange engaging the slotted plate g^2 on the lug *t* of the spindle W. When the catches *u v* engage the lug *t* and plate *g′*, the spindle is prevented from rotating. The wire is fed into the hollow head-stock spindle A by the apparatus shown in Fig. 14. This feeding apparatus consists of a plate, 4, sliding upon rod 5, projecting from the frame of the machine, and connected to a cord, 1, which passes over pulleys 2 and has a weight, 3, attached to its end, so that as the plate is drawn along on the rod by the weight the wire will be fed into the spindle. On one slide-rest the shaping-tool is placed, and on the other rest the tool for cutting off the finished screw is placed. The transverse shaft J is common to both slide-rests, and the construction is similar in both, except that one part is without the cog-wheels M and K.

The operation is as follows: If the chuck F is open—that is, if the jaws *b b* are not pressed together by the lever *h*—the wire, the end of which has been shaped according to the desired length of the screw exclusive of the head, is moved forward by the feeding device shown in Fig. 14 until it strikes against the cutting-dies on the spindle W. At this moment the pin *w′* of the shaft Z moves in front of the projection *g′*, which is secured to the die-spindle W, as shown in Fig. 15, and pushes the same forward a little, and at the same time the wire is pushed back to the exact length of the screw to be made by the forward movement of the spindle. Then the corresponding piece S in the saddle U is lifted and offers resistance to the lever *h*, whereby the wire is grasped firmly by the jaws *b* in the chuck. The piece S then falls back to its normal position, and the slide-rest with the shaping-tool, is moved against the wire by the action of the grooved cam. While the wire is being turned off to the required thickness for the next screw, the cutting apparatus is pressed firmly against the wire by means of the second and longer pin, w^2, of the shaft Z engaging the projection *g′*, so that the thread-cutting apparatus grasps the rotating wire, which screws itself into the cutting apparatus, and thus the thread and the head of the first screw are cut at the same time that the length of the next screw is turned, by means of the shaping-tool on the slide-rest. During the cutting of the thread the cutting-dies are pulled forward, and as the plate g^2 does not leave the catch *v* the latter still prevents the rotation of the die-spindle. When the thread is finished, the slide-rest, with the tool, having done its work, recedes, being moved by the cam L. In the meantime the pin *w* of the shaft Z has entered the angular slot of the catch and *v*, by its engagement with the said slot and the projection v^2 the catch *v* is carried away from the plate g^2. At

the same time the piece O is pushed forward by the action of the cam P′ of the wheel P, the projection of the cam pressing against the lug *q*. Thereby the friction-plate V is pushed into the loose pulley T, and the die-spindle W now rotates at a considerable higher speed than the head-stock A, as the pulley T is connected by a belt with the power-shafting or directly with a motor, and thus the completed screw screws itself out of the cutting-dies, and the spindle W is then drawn back into its former position by the spring B^2. The cam of the wheel P has now passed away from under the projection of the parallel rod O, and this rod is also brought back into its former position by a spring. The friction-plate V then releases the pulley T. The slot *v′* in the catch *v* being curved, the latter will be slightly moved on its pivot in proportion as the pin *w*, attached to the shaft Z, passes through it during part of the revolution of the said shaft Z, as shown in Fig. 16. The pin *w* having left the slot *v′* of the catch *v*, the said catch *v* is pushed partly under, while its flange v^2 is pushed partly over the lug *t* by a spring, Y, and the entire mechanism is in its former position. The grooved cams, which cause the motion of the slide-rest, can be changed, if desired, and the movements of the slide-rests are thus varied according to the position of the grooved cams on the shafts. The projection *q′*, secured to the die-spindle W, is adjustable to regulate the length of the screw-thread, as the farther away from the head of the spindle W carrying the screw-cutting dies the projection *g′* is situated the sooner it will come in contact with the revolving pin *w′*, and therefore the screw cut will be longer than if the projection *g′* is situated nearer to the die-head. The second head-stock, B′ B′, is adjustable on the bed of the lathe, as is also the wheel R^3, through which the revolution of the wheel R^2 is transmitted to the wheel R^4, their relative positions to each other being determined by the length and size of the article being made. The longer the article the farther apart they have to be put; the shorter the article the nearer together.

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

1. A screw-cutting machine consisting of the hollow head-stock spindle A, in combination with the pawl D′, the chuck F, the sliding rests G G, the die-spindle W, having the lug *t* and projection *g′*, the loose pulley T, the friction-plate V, the parallel rod O, catches *u* and *v*, the ratchet-wheel E, the shaft *j*, the shaft J, the bevel-wheels K K′, the cog-wheels M, R′, R^2, R^3, R^4, and P, the latter being provided with a cam, and shaft Z, having projecting pins, substantially as set forth.

2. In a screw-cutting machine, the chuck F, consisting of a circular piece having a recess, *a*, combined with a movable half-ring, *r*, the levers *h h′*, and the jaws *b b*, substantially as herein shown and described.

3. In a screw-cutting machine, the slide-rest consisting of the pieces *f*, G, G, and U, and the shaft J, combined with the bevel cog-wheel K, the grooved cam L, the cog-wheel M, the cams Q Q, the levers R, and movable pieces S, substantially as herein shown and described.

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

EDUARD HEINRICH FRETER.

Witnesses:

FRANZ HASSLACHER,

JOSEPH PATRICK.