(No Model.) 4 Sheets—Sheet 1.

E. SEGER.

CAPSULE MACHINE.

No. 375,776. Patented Jan. 3, 1888.

Fig. 1.

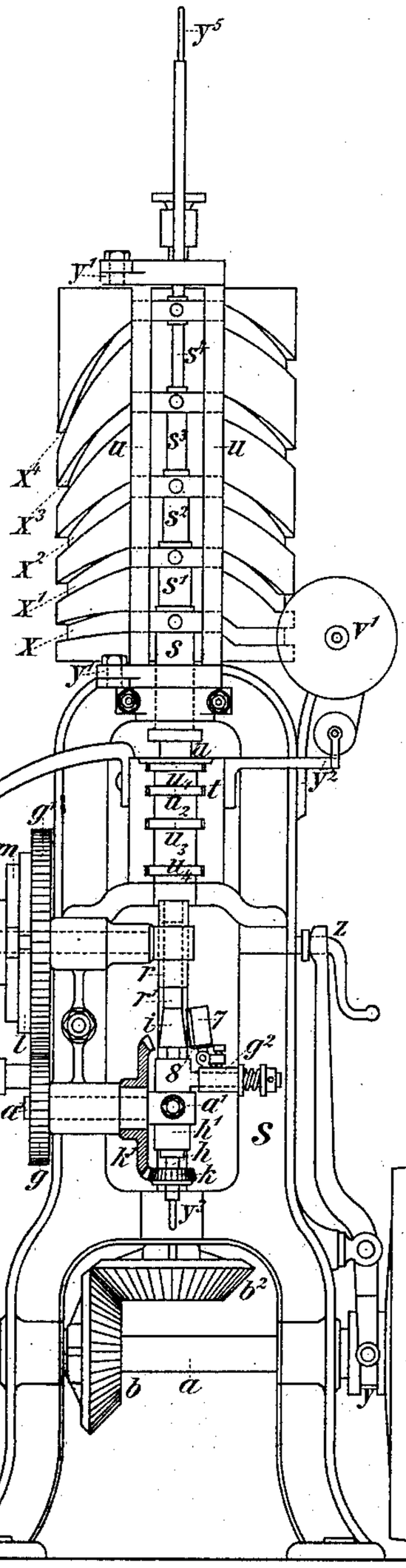
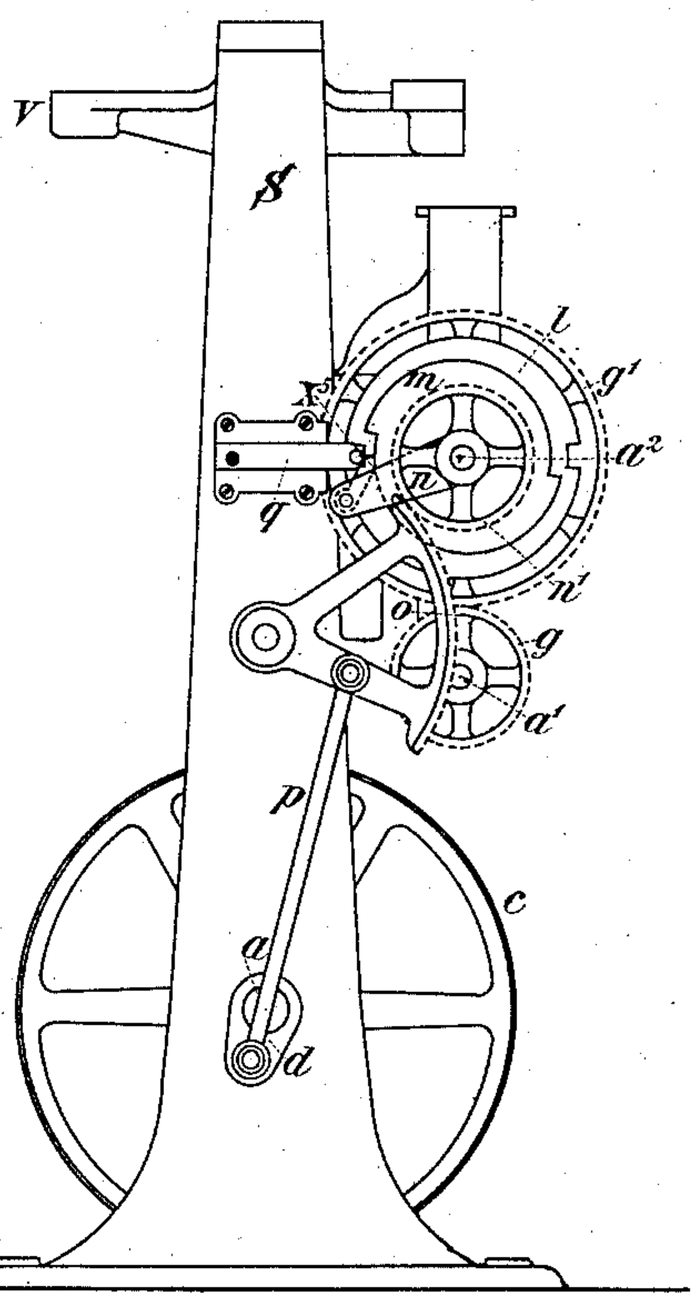


Fig. 2.



Witnesses:
Will L. Morton
W. A. Stearns

Inventor:
Eberhard Seger
by John J. Halsted & Son
his Attys.

(No Model.) 4 Sheets—Sheet 2.

E. SEGER.

CAPSULE MACHINE.

No. 375,776. Patented Jan. 3, 1888.

Fig. 3.

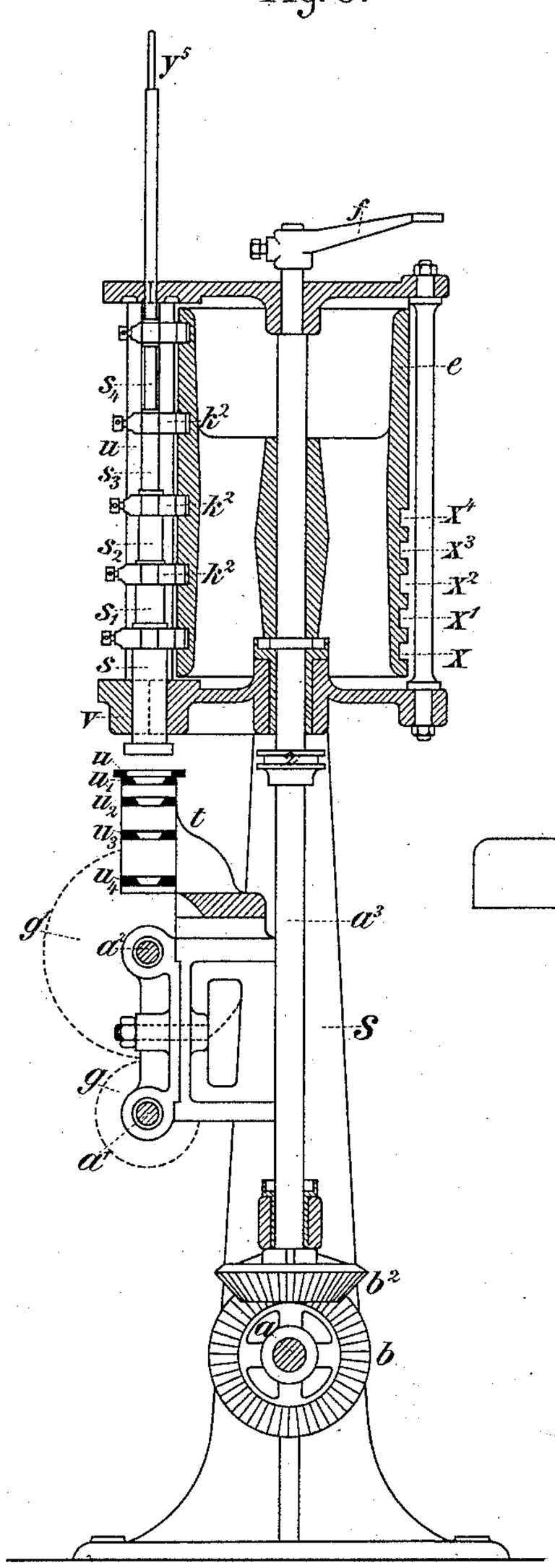


Fig. 7.

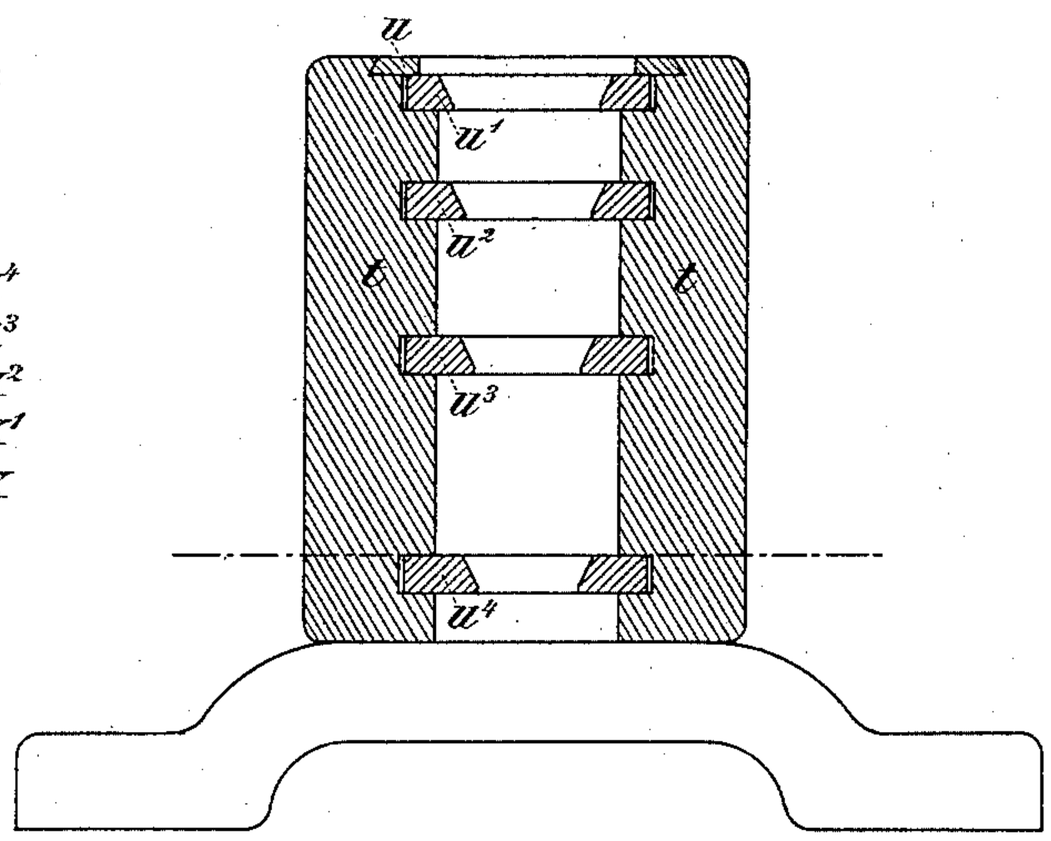
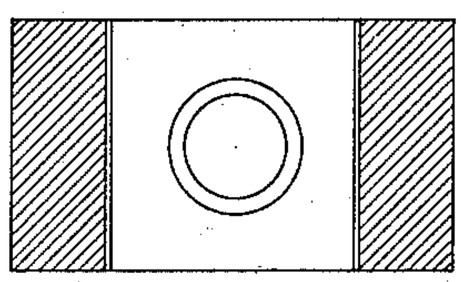


Fig. 8.



Witnesses:
Will A. Norton.
W. E. Stearns

Inventor:
Eberhard Seger,
by John J. Halsted & Son
his Attys.

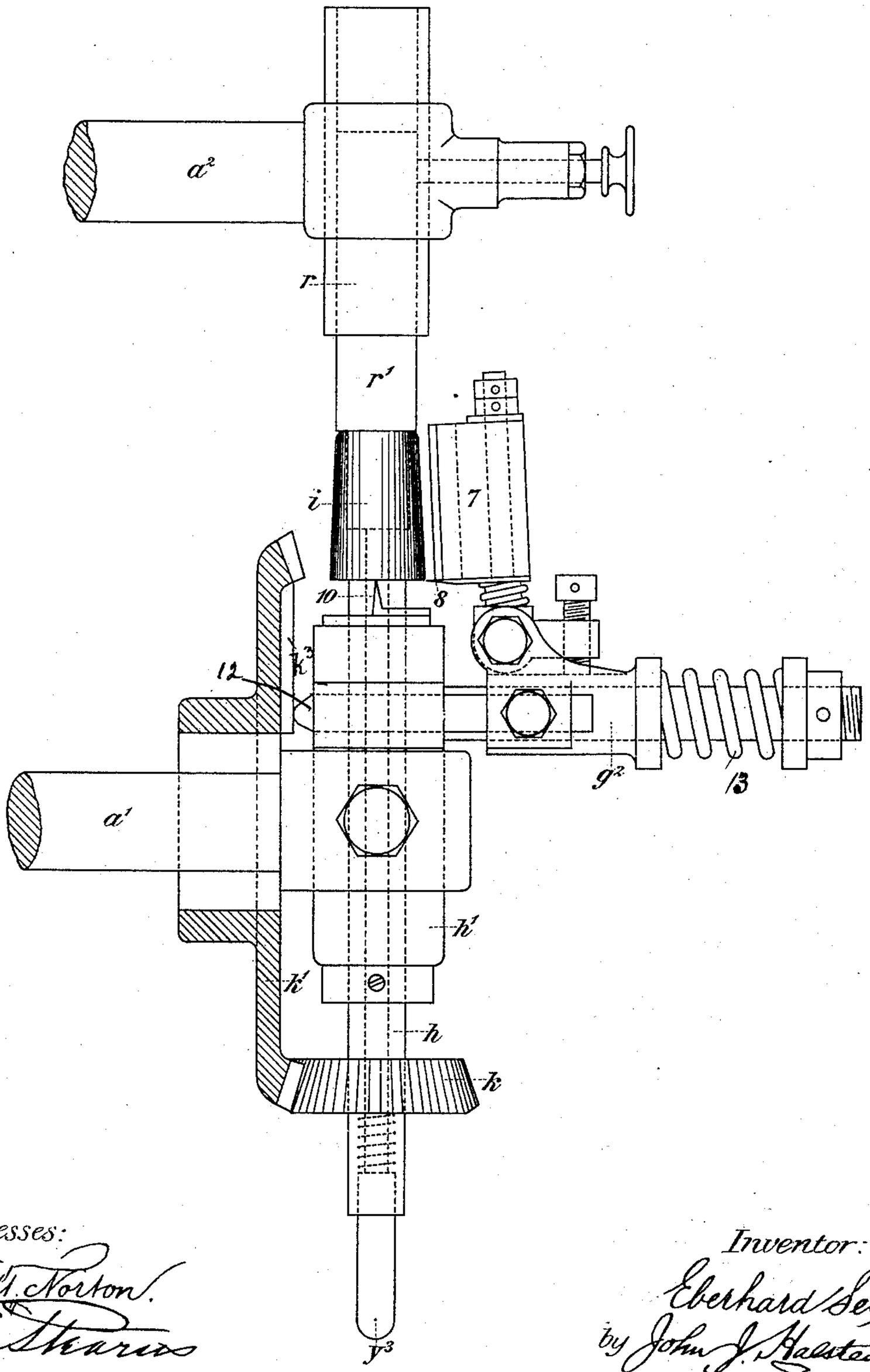
(No Model.) 4 Sheets—Sheet 3.

E. SEGER.

CAPSULE MACHINE.

No. 375,776. Patented Jan. 3, 1888.

Fig. 4.



Witnesses:
Will A. Norton.
W. E. Stearns

Inventor:
Eberhard Seger,
by John J. Halsted & Son
his Attys.

(No Model.)

4 Sheets—Sheet 4.

E. SEGER.

CAPSULE MACHINE.

No. 375,776. Patented Jan. 3, 1888.

Fig. 6.

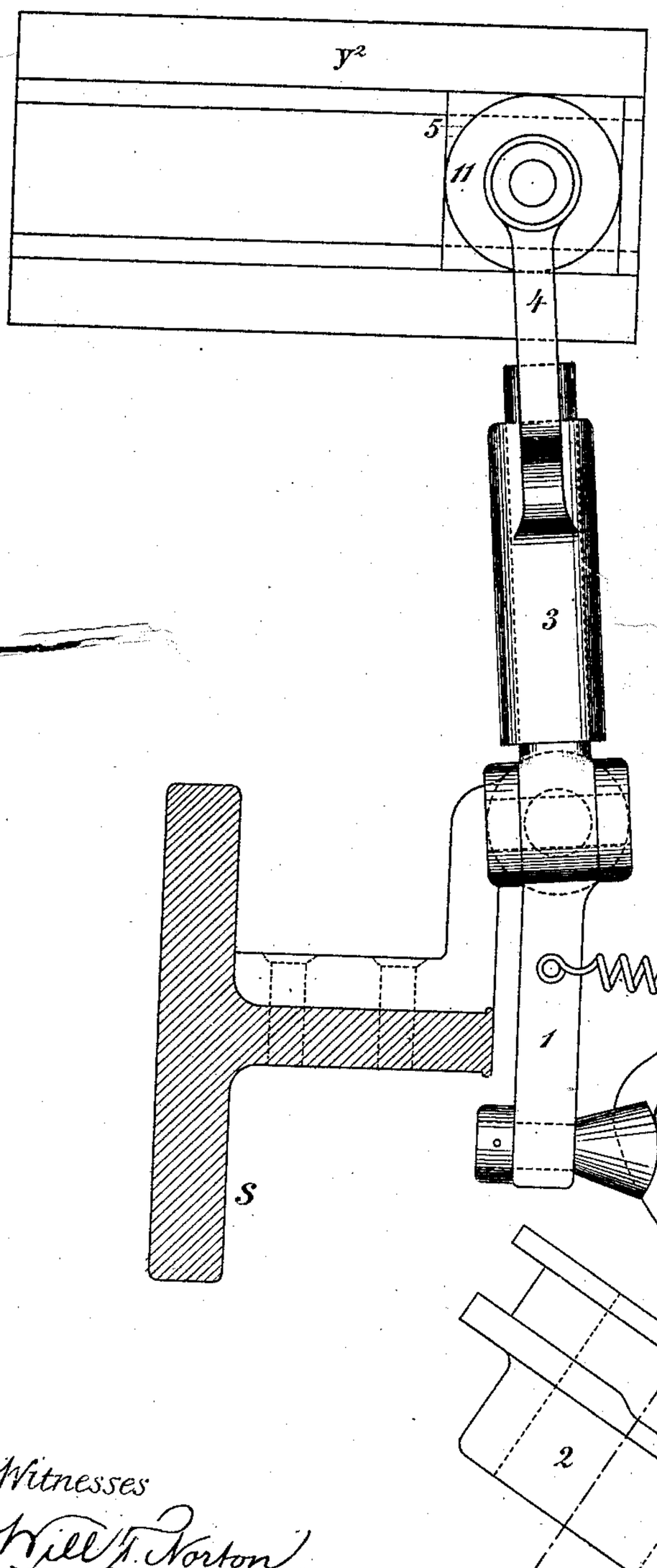
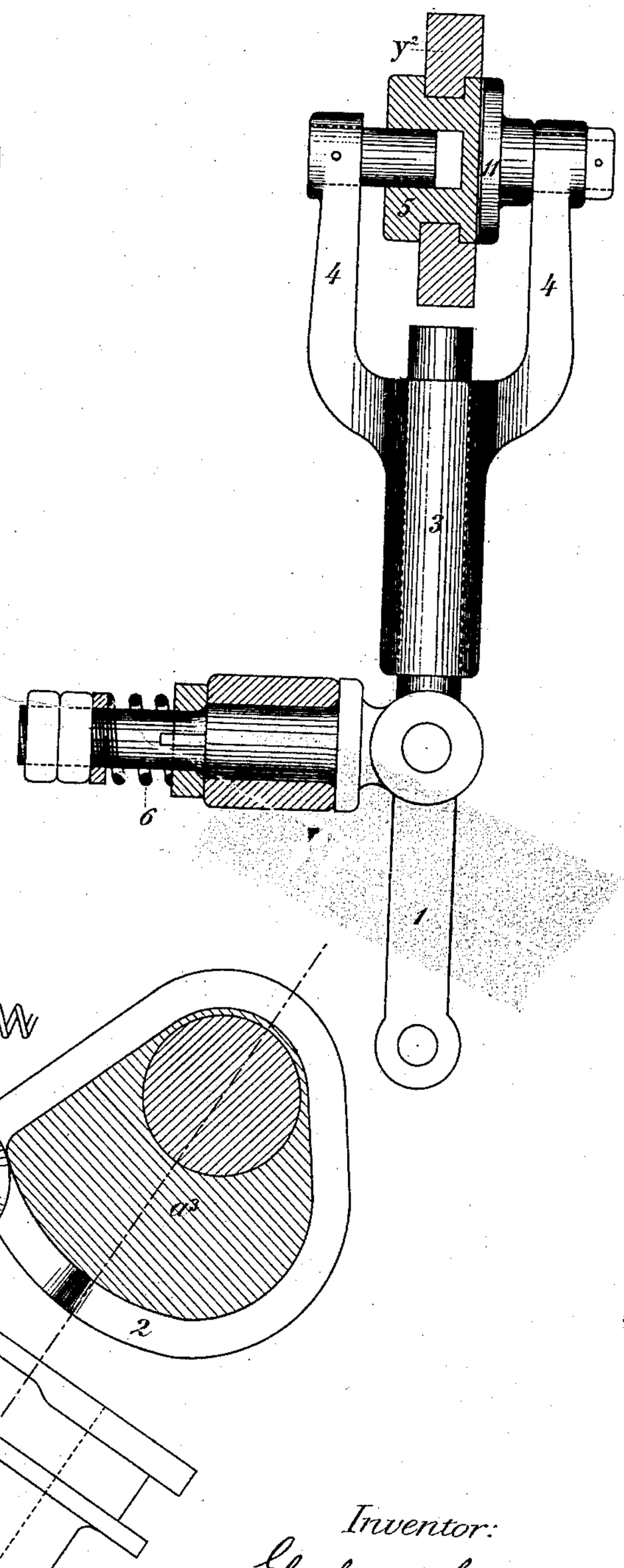


Fig. 5.



Witnesses
Will F. Norton.
W. E. Stearns

Inventor:
Eberhard Seger
by John J. Halsted & Son
his Attys.

UNITED STATES PATENT OFFICE.

EBERHARD SEGER, OF STOCKHOLM, SWEDEN.

CAPSULE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 375,776, dated January 3, 1888.

Application filed April 5, 1887. Serial No. 233,807. (No model.) Patented in Sweden November 30, 1886, No. 829; in Norway December 7, 1886, No. 344; in Belgium December 7, 1886, No. 75,516; in France December 7, 1886, No. 180,129; in England December 7, 1886, No. 16,034; in Germany December 8, 1886, No. 40,650; in Italy December 31, 1886, No. 20,709; in Spain January 17, 1887, No. 6,510, and in Austria-Hungary March 26, 1887, No. 47,580 and No. 11,411.

To all whom it may concern:

Be it known that I, EBERHARD SEGER, a subject of the King of Sweden, and a resident of Stockholm, Kingdom of Sweden, engineer, have invented Improvements in Capsule-Machines, (for which I have obtained patents in the following countries, namely: Sweden, No. 829, dated November 30, 1886; Norway, No. 344, dated December 7, 1886; Belgium, No. 75,516, dated December 7, 1886; France, No. 180,129, dated December 7, 1886; Great Britain, No. 16,034, dated December 7, 1886; Germany, No. 40,650, dated December 8, 1886; Italy, No. 20,709, dated December 31, 1886; Spain, No. 6,510, dated January 17, 1887, and Austria-Hungary, Nos. 47,580 and 11,411, dated March 26, 1887,) of which the following is a specification.

The object of this machine is to make metallic capsules of any size desired.

Irrespective of the moving mechanism itself, the machine consists of the following three principal parts co-operating one with another, viz: The pressing apparatus for pressing out the capsules of the metallic sheet; the feeding apparatus for advancing the metallic sheet to the pressing apparatus, and the finishing apparatus for trimming the capsule, cutting its edges to the desired length, and removing it out of the machine.

In the annexed drawings, Figure 1 is an end view of the machine; Fig. 2, a side view of the moving mechanism of the finishing apparatus; Fig. 3, a longitudinal section of the machine; Fig. 4, details of the finishing apparatus; Figs. 5 and 6, details of the feeding apparatus, and Figs. 7 and 8 views enlarged of the matrices of the pressing apparatus.

The machine receives its motion from the shaft *a*, supported in the lower part of the frame S. The ends of the shaft *a*, which project out of the frame, support one a pulley, *c*, having for its purpose to transfer the force or power to the machine, and the other a crank, *d*. The pulley *c* is connected with the shaft *a* by means of a friction-clutch, *y*, which is operated by the screw *z*. The crank *d* transfers the motion of the shaft *a* by means of a connecting-rod, *p*, to the finishing apparatus, while the pressing and the feeding apparatus receive their motions from a vertical shaft, a^3, which supports at its lower end a bevel-toothed wheel, b^2, gearing with another such wheel, *b*, secured to the part of the shaft *a* which is situated within the frame S.

The pressing apparatus consists, principally, of the tubular dies *s* s' s^2 s^3 s^4, telescoped one into another, and which may respectively receive an alternate motion up and down, and for this purpose their top ends are connected with cross-bars k^2, the pins of which are provided with rollers which run in grooves *x* x' x^2 x^3 x^4 cut into a cylinder, *e*, attached on the upper part of the shaft a^3. On the curved surface of the cylindric drum the grooves from their horizontal portions pass first downward parallel one with another, then again horizontal, and, lastly, upward, each superposed groove having a greater pitch than the next adjacent lower one. In consequence of this shape of the grooves the dies running in them will, when going down, move all with the same speed and stop in their lowest position while the rollers are passing the horizontal parts of the grooves; but owing to the grooves having not the same length, so that every superposed groove has a longer downward and a shorter horizontal portion than the subjacent or next lower one, each superposed die continues its motion after the subjacent one has stopped, and in this manner every subsequent die will be pressed deeper down than the next preceding one. When, lastly, the last die has got down to its lowest position, the rollers of all the dies enter simultaneously in the arising parts of the grooves, the pitches of which are so adapted that all the dies occupy their highest positions at one and the same time. When going up and down, the dies are conducted by the guides *u*, firmly united one with another, and in which the cross-bars of the dies run, and those guides being pivoted on hinge-joints y', the dies, when necessary, may easily be taken out and replaced by others.

The guides are supported by an arm, *v*, projecting out from the frame. Below this arm another arm likewise projects from the frame, which latter arm has two vertical walls, *t*, Fig.

7, provided with horizontal slots, one above another, in which the matrices u u' u^2 u^3 u^4 corresponding to the dies are inserted. These slots are made so spacious as to allow a little play in all directions of the horizontal plane, whereby each matrix adjusts itself automatically perfectly central with relation to its corresponding die, when the dies are going down into the bevel central openings or "eyes" of the matrices, Figs. 7, 8. By this means the advantage is obtained that the capsule when being pressed out by the gradually-diminishing diameter of the eyes is not exposed to an unequal pressure, whereby it otherwise very easily might be split when being pressed out.

The feeding apparatus, Figs. 5 and 6, is situated below the drum e, and receives its motion from a cam or eccentric, 2, attached on the vertical shaft a^3. In a groove cut in the border of this eccentric a pin at the one end of the feeding-arm 1 runs, which pin is forced into contact with the eccentric by means of a spiral spring connecting this end of the feeding-arm with the frame S. The feeding-arm, being at its middle supported by a double-jointed pivot fixed on the frame, and being pivoted there, is provided with a movable fork, 3, the branches 4 of which clasp a plate, 5, movable in the feeding-table y^2, which plate, together with the plate 11 in the upper branch of the fork, advances the metallic sheet.

The groove of the eccentric 2 is shaped so as to impart to the pin of the feeding-arm running therein a motion as well in a horizontal as in a vertical direction, which motion is transferred to the feeding-arm. In consequence of the latter being pivoted at its middle this motion is transferred to the fore end of the feeding-arm in such a manner that the upper branch of the fork, together with the plate 11, connected therewith, will at its position most remote from the dies be pressed against the metallic capsule-sheet, which is introduced below the plate actuated by the upper branch of the fork and above the plate 5, movable in the feeding-table. During the continued motion of the eccentric 2 the fork, with the plate 5 and the intermediate capsule-sheet, is advancing toward the dies, whereby the sheet is unrolled from the roller v', situated above the feeding-table and its fore end pushed in under the dies. Owing to the curvature of the groove in the cam, the pressure of the fork upon the capsule-sheet ceases just at this moment, and in consequence of the action of the spiral spring upon the rear end of the feeding-arm the latter is returned to its first position followed by the plate 5, connected with the lower branch of the fork, and by the plate 11, attached to the upper branch. By adjustable bolts fixed at the feeding-table the length of the forward and-backward stroke of the plate 5 may be adapted at will, whereby the feeding may be regulated most accurately. The metallic scraps are removed in the gutter y^4. When the capsule-sheet has been introduced under the dies, these commence their downward motion, whereby first the circular disk is punched out, of which the capsule is to be formed, and then the capsule is given by degrees a more and more hollow shape as it is pressed by each subsequent die through the eye corresponding to that die in the matrix underneath u u^4. In other words, the planchet is punched out at the downward motion of the dies, when the lowest die, s, penetrates it and is pressed into the corresponding eye in the uppermost matrix, u. The capsule, when having passed through the last matrix, is brought over to the finishing apparatus by a rod, y^5, running in the last die, and which in the moment when the capsule is to be brought over receives a rapid downward pressure by an arm, f, fixed on the upper end of the shaft a^3. The rod y^5 receives a rapid motion from the arm f, (which is fixed on the top of shaft a^3 and rotates with this shaft,) because the end of the arm f during every rotation passes once over the top of the rod y^5, and thereby presses it down rapidly.

The finishing apparatus, Figs. 2 and 4, consists of two co-operating parts, one above another, of which the upper one receives the capsule from the pressing apparatus and carries it over to the subjacent part, where the capsule is cut, trimmed, and delivered from the machine. Each part is supported by its respective horizontal shaft a' a^2, which are connected by a gearing, g g', with a rotary relation as one to two, so that when the upper shaft, a^2, makes half a turn the lower one accomplishes a whole revolution.

The finishing apparatus receives its motion through the upper shaft by a loose toothed wheel, n', at the end of this shaft, gearing with a toothed sector, o, having an alternate motion, and being connected by means of the connecting-rod p with the crank d, attached on the shaft a. The shaft a^2 is caused to participate in the forward motion of the sector, whereby a pawl, x^5, placed on an arm, n, connected with the loose toothed wheel n', engages alternately with two ratchets in a wheel, m, which is firmly fixed on the shaft a^2, in consequence of which the shaft is turned half a revolution every time the pawl x^5 operates one of the ratchets. After each half-revolution, the shaft a^2 is locked by a bolt, q, on the frame, which bolt by a spring is pushed into a slot in the locking-wheel l, fixed firmly on the shaft a^2 abreast of the ratchet m. In this position the bolt q remains until the toothed sector o has accomplished its retrograde motion, when the pawl x^5 of the arm n, connected with the toothed wheel n', passes behind the bolt in the commencement of its advance movement and operates to push the bolt out of the slot, and then to engage with the opposite ratchet in the wheel m, thus causing the shaft a^2 to make half a revolution. The upper shaft, a^2, is, at the end which is situated within the frame below the matrices, provided with a pipe, r, attached perpendicular to the shaft, the longitudinal axis of which pipe coincides with that

of the dies when the shaft a^2 is at rest. This pipe contains a movable cylinder, r'. When the capsule, after being formed, is about to leave the pressing apparatus, it is forced into the upper end of the receiving-pipe r of the finishing apparatus, the pipe being then, by the above mechanism, turned so as to direct its upper end downward and the opposite end upward. In the latter end a new capsule is then forced in from the pressing apparatus, and thereby the cylinder r' in the pipe is pushed downward, whereby the capsule previously received in the pipe, and now turned downward, is brought over to a mandrel, i, attached on the part of the finishing apparatus, which is supported by the lower shaft, a'. This lower shaft, a', is, on the end which is situated within the frame and below the receiving-pipe r, provided with a shell, h', fixed perpendicular to the shaft. In this shell a spindle, h, moves in and out, and is provided at its one end with the above-mentioned mandrel i and at its other end with a bevel toothed wheel, k, gearing with another such wheel, k', firmly fixed in the frame. Owing to this disposition the spindle h receives a rotatory motion about its own axis every time the lower shaft of the finishing apparatus makes a revolution. On a shell, g^2, movable along an arm projecting from the shell h', there is, further, opposite to the mandrel i, a holder, 7, with a bit of leather, which, at the rotatory motion of the mandrel, is pressed against the capsule on the mandrel, thus trimming it. At the lower border of the holder a knife, 8, is fixed and directed toward the mandrel, which knife is alternately caused to stand off from and alternately pressed against the lower border of the mandrel. To effect this action the projection 12 on the shell or sleeve g^2, which is connected with the holder 7, is, by means of a spring, 13, constantly pressed toward the inner face of the toothed wheel k', firmly fixed on the frame, and which on a part of its surface is provided with an upright guide bar or rib, k^3. When the lower shaft of the finishing apparatus commences its motion, the fore part of the shell leaves the guide-bar and descends upon the plate. So long as it (actuated by the spiral spring) moves toward the plate, the knife 8 is pressing against the lower border of the mandrel i, in consequence of which the edges of the capsule are cut off during the rotatory motion of the spindle. When the cutting of the edges is performed, the knife withdraws from the capsule, so that the fore part of the shell g^2 gets again upon the guide-bar. In order that the rim of the capsule cut off may be removed from the shaft h, which would be impossible if it be not opened anywhere, the shell h' is, as shown in Fig. 4, provided with two knives, 10, which, just as the capsule is pushed upon the mandrel i, cut each its vertical slit in the lower border of the capsule, whereafter the knife 8, at the rotatory motion of the mandrel, cuts the horizontal one. The rim or edge of the capsule cut off then drops down in two parts from the machine and cannot stick to the shaft h. The finished capsule is lastly thrown off the mandrel by the pressure of a rod, y^3, sliding in the spindle h, and being pushed out when the end projecting out of the spindle encounters, when the spindle-shell is revolving, any appropriate arm or object fixed on the frame.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A capsule-machine having, in combination, a series of tubular dies, s s' s^2, &c., arranged to telescope one into another and serving to successively press down the capsule-planchet, and a corresponding number of movable self-adjusting matrices, u u' u^2, &c., the combination being and operating substantially as set forth.

2. The described means for advancing the planchet-sheet, consisting of the combination of the fork 3 4, having a horizontal and a vertical motion, plate 5, table y^2, and plate 11, substantially as shown and described.

3. The described means for carrying the capsule over from the matrices to a mandrel, i, consisting of the combination of shaft a^2, tube or pipe r, and sliding cylinder r', all substantially as set forth.

4. The described means for delivering the pressed capsule, consisting of the combination of the horizontal shaft a', shell or sleeve h', hollow shaft h, rod y^3, and mandrel i, all substantially as set forth.

5. The described means for transferring the motion of the main shaft a to the carrying and delivering mechanism, consisting in the combination of the crank d, connecting-rod p, oscillating sector o, loose gear n', its supporting-shaft a^2, arm n, and its pawl x^5, bolt q, locking-wheel l, ratchet-wheel m, tube r, shaft a', and gears g and g', substantially as set forth.

6. The described means for cutting off the uneven edge of the capsules, consisting in the combination of a knife, 8, arranged to be alternately held off from and pressed against the lower edge of the revoluble mandrel i, and the upright knives 10 on shell h', the combination being and operating substantially as set forth.

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

EBERHARD SEGER.

Witnesses:
H. TELANDER,
T. RISBERG.