No. 670,632. Patented Mar. 26, 1901.

W. F. DAVIS.

DOUBLE SEAMING MACHINE.

(Application filed Apr. 12, 1900.

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

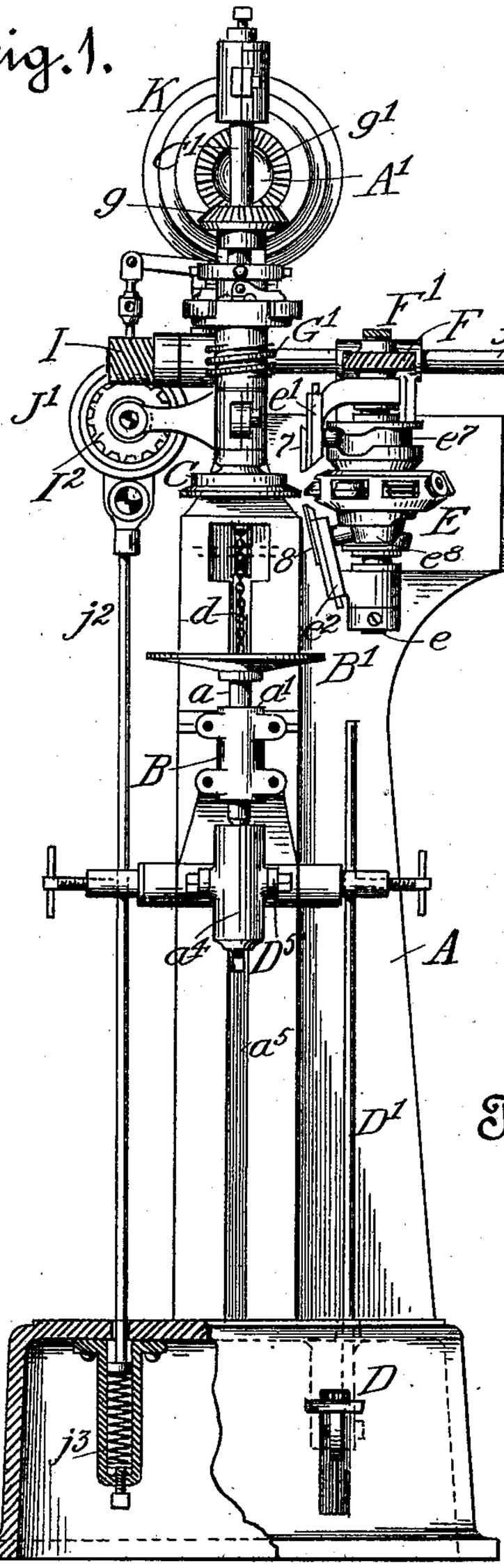


Fig. 2.

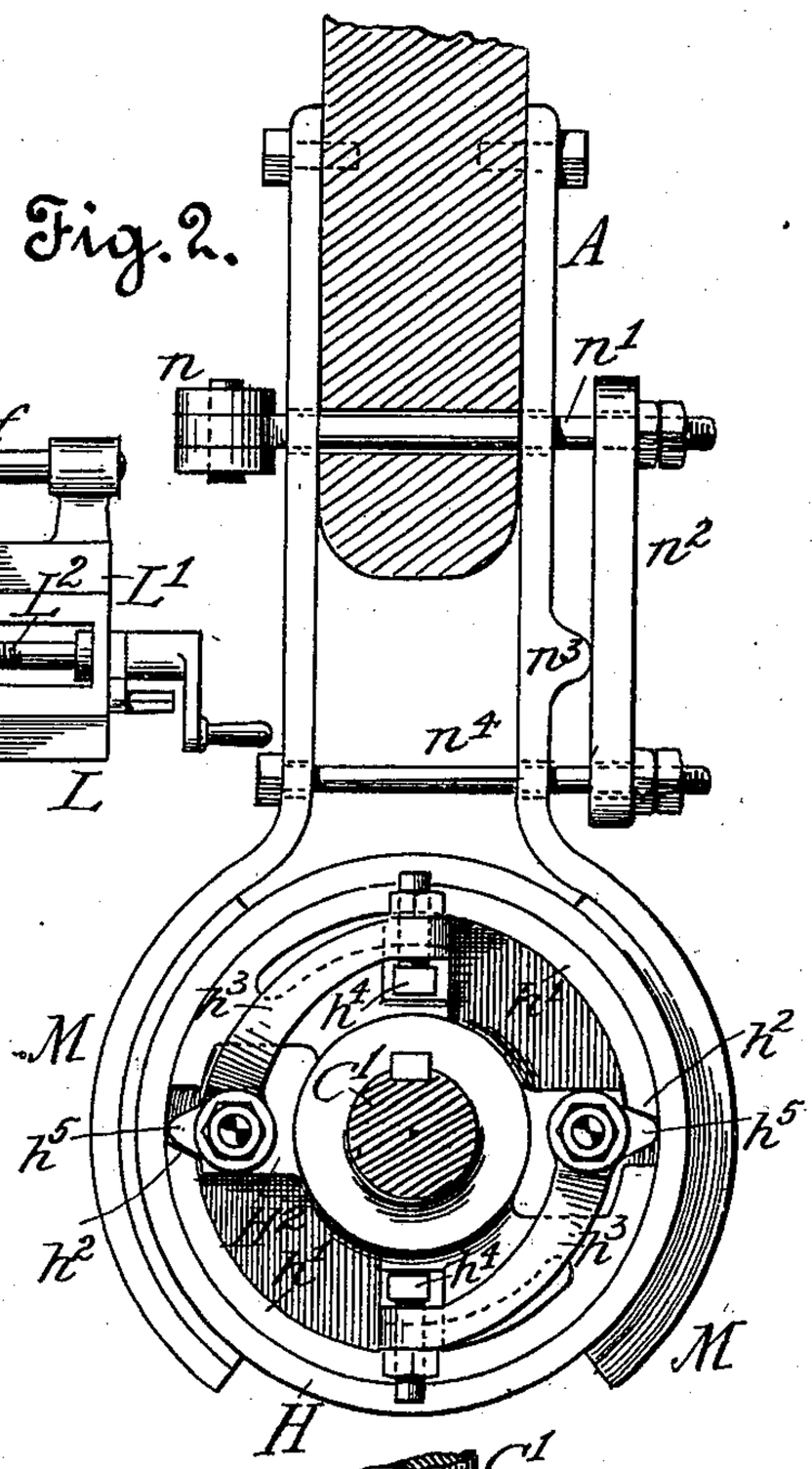
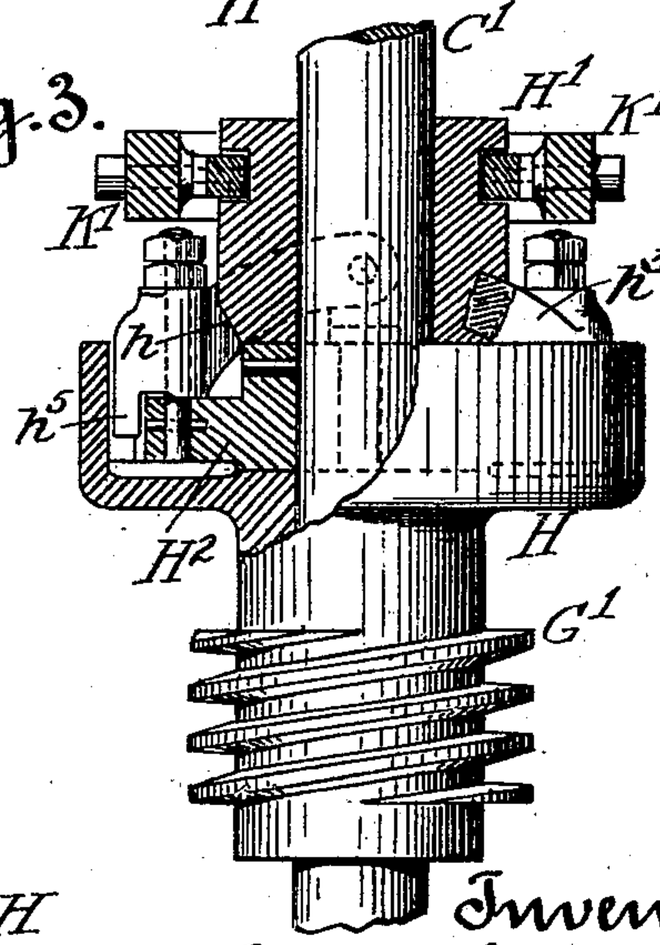


Fig. 3.



Witnesses.

H. E. Montenverde

F. W. Burt

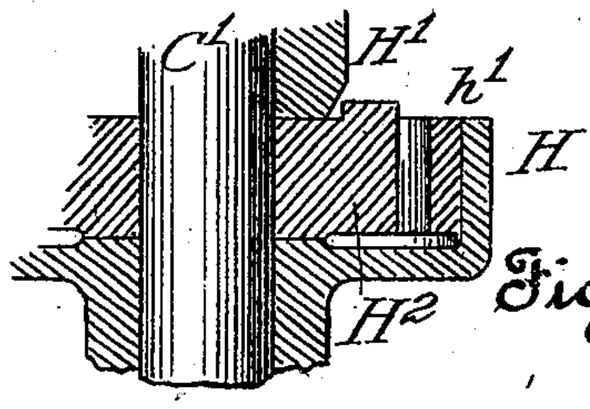


Fig. 4.

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Fig. 5.

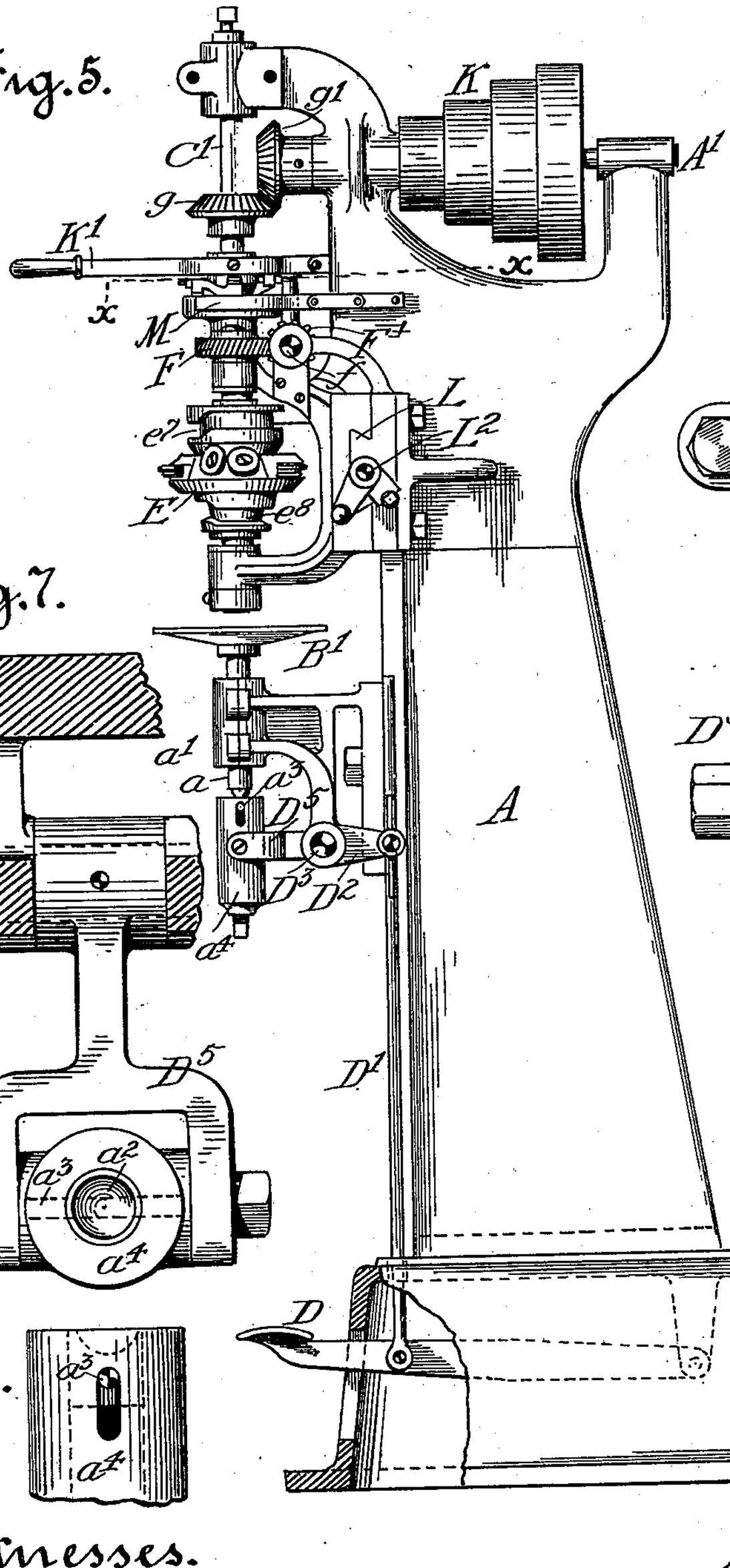

Fig. 6.

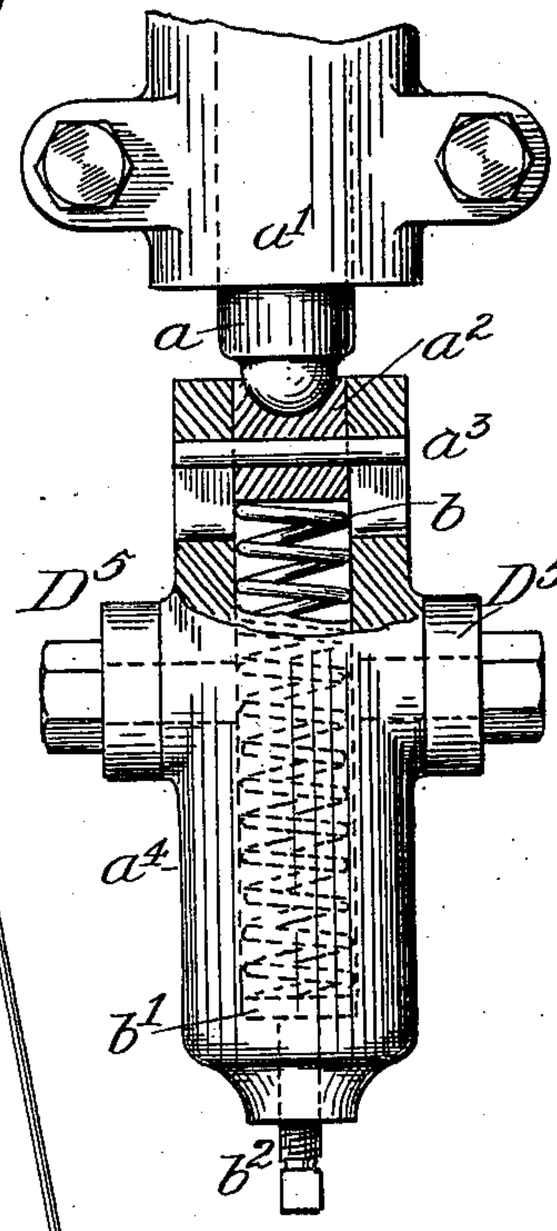

Fig. 7.

Fig. 8.

Witnesses.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 12.

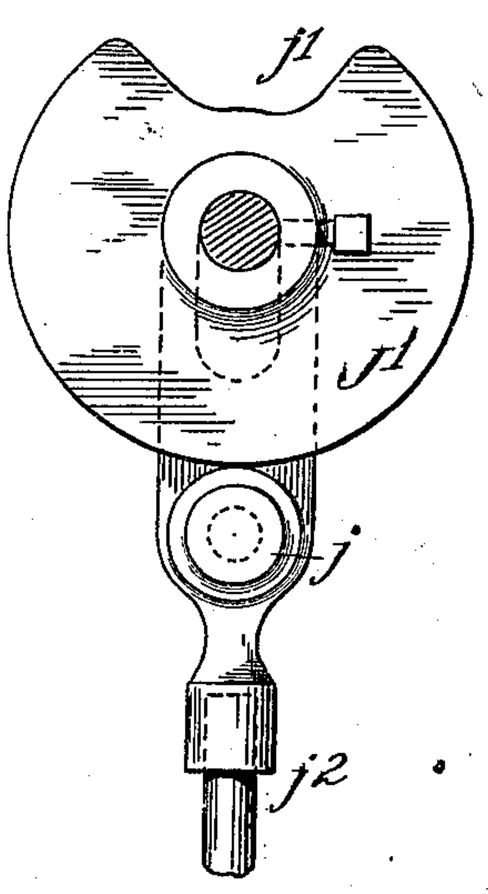

Fig. 13.

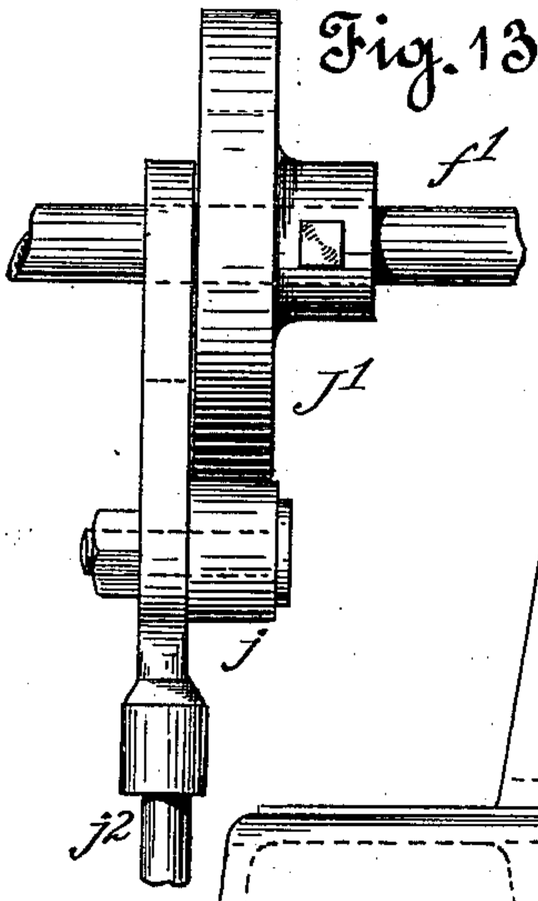

Fig. 9.

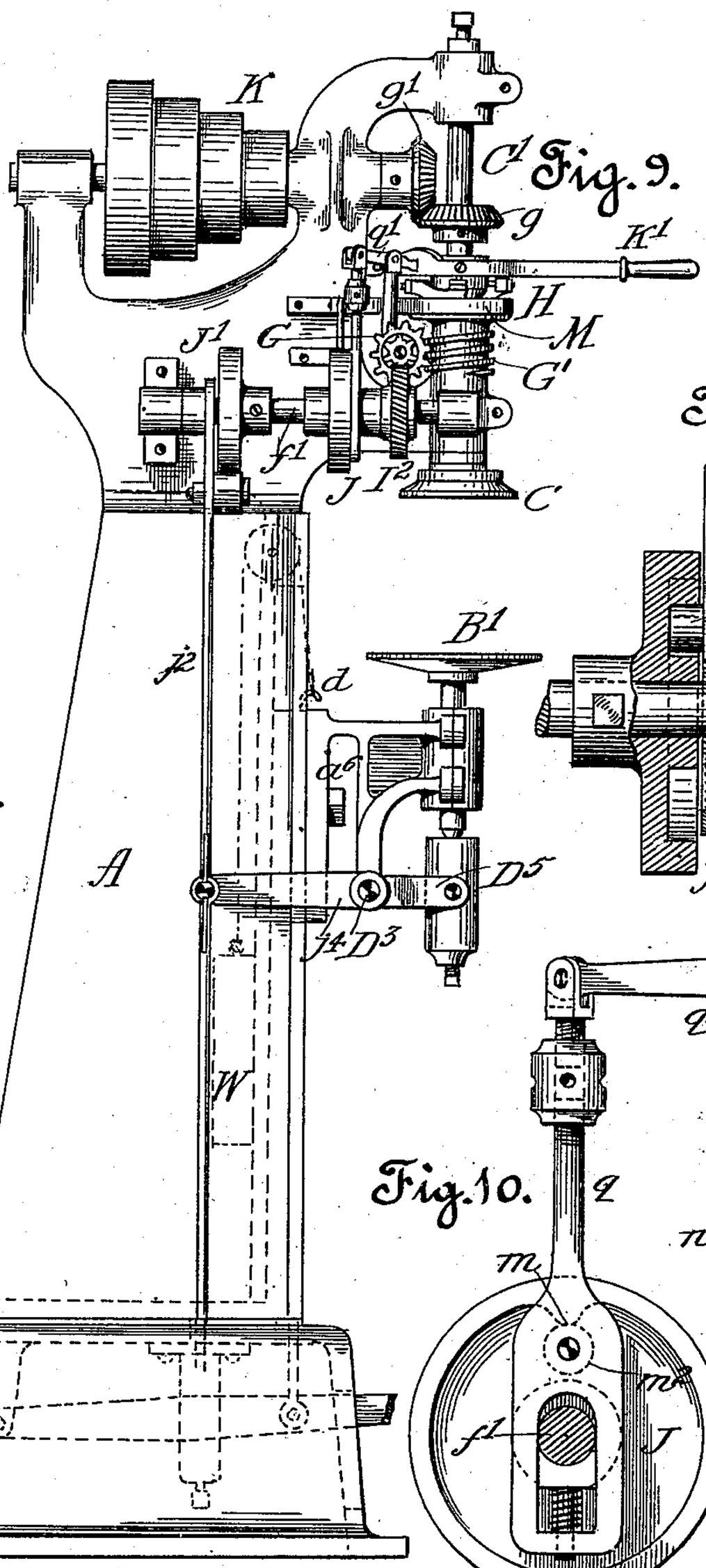

Fig. 11.

Fig. 10.

Witnesses.

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DOUBLE SEAMING MACHINE.

(Application filed Apr. 12, 1900.)

(No Model.) 4 Sheets—Sheet 4.

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UNITED STATES PATENT OFFICE.

WARREN F. DAVIS, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE PACIFIC SHEET METAL WORKS, OF SAME PLACE.

DOUBLE-SEAMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 670,632, dated March 26, 1901.

Application filed April 12, 1900. Serial No. 12,604. (No model.)

To all whom it may concern:

Be it known that I, WARREN F. DAVIS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Double-Seaming Machines, of which the following is a specification.

My invention relates to machinery for securing heads to sheet-metal can-bodies by double-seaming—that is, by placing the flange of the head over the free edge of the body and then turning the two thicknesses of metal together outwardly and downwardly and then compressing them inwardly.

The object of my invention is to provide a machine which will do this work rapidly and perfectly and without preliminary flanging of the can-bodies.

My invention comprises improvements in the way of holding and rotating the can and head, improvements in the construction of the double-seaming mechanism, in the automatic release of the headed cans, in the automatic stoppage of the seaming mechanism after a can has been headed, and in many features of construction which I do not attempt to set forth here, but which are fully hereinafter described and are shown in the accompanying drawings, in connection with which this description should be read.

In the drawings, Figure 1 is a front elevation. Fig. 2 is a horizontal section on line $x\,x$ of Fig. 5. Fig. 3 is an enlarged front elevation, partly in section, of the devices shown in Fig. 2. Fig. 4 is a detail section of the members of the friction-clutch which controls the revolution of the seaming-rollers. Fig. 5 is a side elevation of the machine. Fig. 6 is a detail elevation, partly in section, of the yielding can-support. Fig. 7 is a plan view of said support. Fig. 8 is a detail elevation of the upper end of the slotted casing or sleeve which surrounds said support. Fig. 9 is a side elevation of the machine from the direction opposite to Fig. 5. Fig. 10 is a detail view of the cam-disk which controls the disengagement of the friction-clutch and its connections. Fig. 11 is a section of the same. Fig. 12 is a side elevation of the cam-disk which controls the vertical movement of the can-support. Fig. 13 is a side elevation of the same. Fig. 14 is an enlarged elevation of the rotating head which carries the seaming-rollers. Fig. 15 is a plan of the same. Fig. 16 is an elevation of the bracket which carries the slidable rollers which coöperate with the rollers carried by the head shown in Fig. 14. Figs. 17 to 22, inclusive, show successive positions of the can body and head during the operation of double seaming and the respective rollers which perform these successive operations. Fig. 23 shows a modification in the shape of the finishing-roller shown in Fig. 22. Fig. 24 is a cross-section through the hollow main standard near its base, showing the counterweight for the can-support.

The entire mechanism is carried by a vertical standard A, which is hollow and has at its upper end bearings for a driving-shaft A′, carrying a driving-pulley K.

B is a bracket in a vertical slot a^5 on the main standard and held by a counterbalance W, suspended by a chain d within the main standard. This bracket when properly adjusted for any size of cans is secured in the slot by the bolt a^6. This bracket has a bearing a' for the spindle a of the disk B′, which is the can-body support. The spindle a is seated by a ball-and-socket connection on a block a^2, Fig. 6, which has a guide-pin a^3 working in slots in the casing a^4. A coil pressure-spring b is held in the casing beneath block a^2, the pressure being regulated by the follower b' and screw b^2. This construction prevents the can body and head from being unduly squeezed between the said support and the head-clamp C. When the can, with its head loosely in place, is set upon the support B′, the latter is raised until the body and head are held between such support and the clamp or disk C. A foot-treadle D is adjustably connected by a rod D′ to a crank D^2, secured to a rock-shaft D^3. This shaft has a forked arm D^5, pivoted to the casing a^4. Depression of the treadle lifts the said casing, spindle a, and can-support bodily and vertically, the spindle sliding in its bearings a' and the spring-seat relieving any undue pressure.

The clamp C, which coöperates with the

support B′ to hold the can and its loosely-placed head until the heading operation is completed, is carried by a vertical spindle C′, journaled in the top of standard A, and is constantly revolved by the main shaft through miter-gears *g g′*. When the can-support is lifted so as to clamp the can, the latter and its support derive a rotary motion from the disk C in a horizontal plane. The head is secured and double-seamed with the edge of the body by a series of progressive operations taking place during a number of revolutions of the can-body and produced by the successive actions of a series of rollers 1, 2, 3, 4, 5, and 6, mounted in a revolving carrying-head E, and two other rollers 7 and 8, mounted to slide upon a bracket E′. The carrying-head E is upon a spindle *e*, Figs. 1 and 5, and is driven by the skew-gears F and F′, the gear F being on the spindle and the gear F′ being carried by a horizontal shaft *f*, which has another worm-gear G, Fig. 9. The upright spindle *e* is journaled in arms of the bracket E′, and the bracket itself has a slide L, by which it is adjusted in the guide L′ of the main frame by means of the screw L^2, working in the nut L^3, Fig. 16. This is for the purpose of adjusting the head and rollers to cans of different diameters. The main vertical spindle C′ has a worm G′, which at proper times transmits motion to worm-gear G, shaft *f*, spindle *e*, and the carrying-head. The worm G′ is, however, not fixed upon the spindle C′, but is formed with a loose clutch-sleeve H, Fig. 3, upon said spindle, whose operation will be presently explained.

Upon the outer end of the horizontal shaft *f* is mounted the skew-gear I, which drives a cross-shaft *f′* through a skew-gear I^2 upon the end of said shaft *f′*. Upon this shaft are mounted cam-disks J and J′, Fig. 9 and details on same sheet. A hand-lever K′ is forked to inclose by fitting a groove in the operating member H′ of the clutch, of which the sleeve H forms a part. (See Figs. 2 and 3.) The part H′ is a sleeve loose on the shaft and having a lower beveled edge *h*. The third member of the clutch is a disk H^2, keyed to the shaft C′ and which fits loosely within the flange of the sleeve H. The disk H^2 is cut away to form elastic tongues *h′*, having inclined ends h^2. Pivoted upon the disk H^2 are two curved levers h^3, having adjustable headed bolts h^4 at one end and projecting studs h^5 at the other. These studs when the clutch is in operation bear in opposite directions upon the beveled ends of the tongues *h′*. When the lever K′ is operated to lower the loose sleeve H′, the beveled edge of the latter strikes the two bolt-heads h^4, and so causes the studs h^5 to force the spring-tongues against the surrounding flange of the member H, giving motion to the worm G′. This worm drives the gear G on the shaft *f*, which operates the carrying-head E, as before explained. Thus the main spindle is constantly rotating, as well as the can and head, when in position; but the seaming-rollers do not come into operation until the lever K′ throws the clutch into engagement with the main spindle. At this time the can, with its loose head, has been clamped in such position that the seaming-rollers, before referred to, act upon it successively, while both the can and the roller-carrying head are being revolved, the ratio of revolution being such that the can and head rotate a number of times to one rotation of the roller-carrying head. The seaming-rollers are journaled loosely in the head and operate by frictional contact and pressure upon the can-head. To make the successive operations intelligible, I refer to Fig. 14 and the other figures on the same sheet of the drawings. It will be noticed in the first place, however, that the can-body is a plain cylinder and has had no edge flange formed upon it before being assembled with the head for double-seaming. On the contrary, this machine acts on plain can-bodies and flanged can-heads, the latter being sunken or paneled deeply enough to allow sufficient material to form the double seam between body and head. The first step, Fig. 17, is the squeezing of the can-head flange against the can-body by means of the flat-faced roller 1. As the can rotates many times faster than the roller-carrying head, the parts have been fully brought to the shape shown in Fig. 17 before the second roller 2, Fig. 18, is brought into operation. This roller 2 has a narrow flat face, which continues to hold the can and head up against the disk C; but it also has a curvilinear periphery forming a resistance to the compression exerted by the upper adjustable roller 7. The latter has a beveled edge, which turns the double flange out at an angle, while the curved face of roller 2 causes the edge of the head-flange to bend downward, all as shown in Fig. 18. At the next step, Fig. 19, the roller 3 comes into operation and performs two functions. It has an upper flat-bottomed ledge 13, which continues to hold the double flange down, and now against a sharply-beveled lower surface 23, the latter closing the turned-over and projecting edge of the head flange against the other two thicknesses. At the next step, Fig. 20, the inclined roller 4 from above coöperates with the lower slidable roller 8 to continue the operation of turning over the double flange which has been formed, but is not fully pressed in against the can-body. In Fig. 21 the roller 5 continues this operation just before the roller 8 loses contact, as shown, while in Fig. 22 the last roller 6 of the series finishes the compression and leaves the can double-seamed. The double seam produced by this finishing-roller has a rounded or beaded effect, caused by the shape of the roller. If, therefore, a flattened seam is desired, the roller 16, Fig. 23, should be substituted for the roller 6.

The rollers 7 and 8, the effect of whose operations has been described, but not their construction, are mounted so as to have a

sliding motion toward or from the point of operation. They are journaled in arms e' e^2 of bracket E′ and upon slide-blocks e^3 e^4, each of which carries a roller e^5 e^6. These rollers last named engage with the cam-grooves e^7 e^8 in the carrying-head, Fig. 14, which are so arranged that the rollers 7 and 8 come into operation from above and below at the proper times, as before described, and in the manner shown in Figs. 18, 20, and 21.

While the clamping of the can and its head and the engagement of the friction-clutch are performed by the operator, the first by means of the foot-treadle D and the latter by the lever K′, the release of the can and the disengagement of the clutch are done automatically after the seaming-rollers have completed their work. These results are produced by the cam-disks J′ and J on the shaft f' operating through connections shown in Fig. 9 and in details on same sheet. The disk J′ bears normally upon a roller j, carried by the slotted end of a rod j^2, suspended from the shaft, the latter passing through the slot. This rod is pressed by a spring j^3 at its lower end in the base of the standard, Fig. 1; but the spring is normally overcome by the action of disk J′ upon the roller j. The rod is connected by an arm j^4 to the rock-shaft D^3 and so to the can-support. A deep recess j' is formed in the edge of the cam-disk, and the shaft f' is timed and the disk J′ is positioned so that at the end of a revolution of the roller-carrier or head the recess permits the pressure-spring to force rod j^2 upwardly, and so lower the can-support with the headed and double-seamed can away from contact with the clamp above. While this is taking place, the cam-disk J is also in operation. This disk has a raised rim provided with an interior projection m and an exterior projection m'. The projection m bears at the proper time upon a roller m^2 on the slotted and spring-pressed rod q. A pivoted lever q' is connected to rod q and to the hand-lever K′, Fig. 9. The depression of rod q raises lever K′ and the member H′ of the friction-clutch, thereby releasing the latter. At the same time the projection m', through lever n and link n', Figs. 2 and 10, clamps a brake upon the part H of the clutch and stops the motion and that of the driving-worm G′, carried by it. The brake comprises two spring-arms M M, secured to the main frame, Fig. 2, and having curved extremities adapted to bear upon the clutch-disk H. The link n' is connected to a lever n^2, which bears upon a projection n^3 upon one of the brake-arms. This link is in turn connected by a rod n^4 to the other brake-arm. The motion of lever n', communicated to the link and with the projection n^3 as a fulcrum, draws the brake-arms toward each other and so clamps them upon the clutch-disk. The motion of the seaming-rollers stops immediately, and the can, with its head double-seamed and complete, can be removed from the support.

In operating this machine it is not the intention that the operator, by means of the foot-treadle D, shall do more than raise the can-support, so that the can-head makes a contact with the upper clamp. The actual pressure is derived from the cam-disk J′. At the beginning of the operation the roller j is in the recess j'. As soon, however, as the operator depresses the lever K′ the gearing starts into operation, the roller j leaves the recess, and the disk J′ forces the rod j^2 downward and holds it there until the complete revolution of said cam-disk brings the recess around again. The connection of rod j^2 to the can-support maintains the pressure against the upper clamp. The operator may immediately remove his foot from the treadle after depressing the clutch-lever.

I do not limit myself to exact details of construction shown in the drawings and herein described, as I desire to avail myself of such modifications and equivalents as fall properly within the spirit of my invention.

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

1. In an automatic double-seaming machine for operating upon flangeless can-bodies and their heads, a rotary clamp adapted to receive and rotate a can-body and its head, a rotary carrier having a series of seaming-rollers, gearing for driving the rotary clamp, gearing for driving the rotary carrier, and means for engaging and for disengaging said gearings.

2. In an automatic double-seaming machine for operating upon flangeless can-bodies and their heads, a rotary clamp adapted to receive and rotate a can-body and its head, a rotary carrier having a series of seaming-rollers, gearing for driving the rotary clamp, gearing for driving the rotary carrier, a hand-lever for causing the engagement of said gearings, and automatic means for causing their disengagement.

3. In a double-seaming machine, a rotary clamp for holding a can body and head, in combination with a rotary carrier-head, a series of seaming-rollers carried by said head, and independently-mounted sliding rollers, said revolving rollers adapted to act successively upon the said body and head, and said sliding rollers being adapted to also act upon said body and head.

4. In a double-seaming machine, a rotary clamp for a can body and head, gearing for rotating the same at relatively high speed, a carrier having a series of seaming-rollers, and gearing for rotating said carrier at relatively low speed.

5. In a double-seaming machine, a vertically-movable can-support, a rotary chuck or clamp coöperating therewith to hold and rotate the cans and heads, a rotary carrier having seaming-rollers, a clutch on the spindle of said chuck, gearing for driving said carrier deriving motion from said clutch, and means also operated by said clutch when in engage-

ment, for automatically disengaging said clutch and for releasing the can from the clamp.

6. In a double-seaming machine, a constantly-rotating clamp or chuck, a clutch on its spindle having a gear, a rotary carrier having seaming-rollers, gearing between said clutch-gear and said carrier for driving the latter, a lever for throwing said clutch into engagement with the chuck-spindle, and a cam operating at the same relative speed as the said carrier, and having connections operated at each revolution for reversing said lever.

7. In a double-seaming machine, a seaming implement comprising a rotary carrier, a series of rollers journaled in the periphery of said carrier, and in substantially the same horizontal plane, upper and lower sliding rollers and cam-grooves in the carrier for moving said upper and lower rollers toward and from the point of double-seaming, whereby they are caused to coöperate with said rollers in the carrier.

8. In a double-seaming machine, a constantly-rotating clamp, a clutch on its spindle having a gear, a rotary carrier having seaming-rollers, gearing between said clutch-gear and said carrier for driving the latter, a lever for throwing said clutch into engagement with the clamp-spindle, a rotary cam having connections operated at each of its revolutions for reversing said lever, a brake for stopping the clutch as soon as disengaged, and connections between the said cam and said brake.

In testimony whereof I have affixed my signature, in presence of two witnesses, this 5th day of April, 1900.

WARREN F. DAVIS.

Witnesses:
L. W. SEELY,
F. M. BURT.