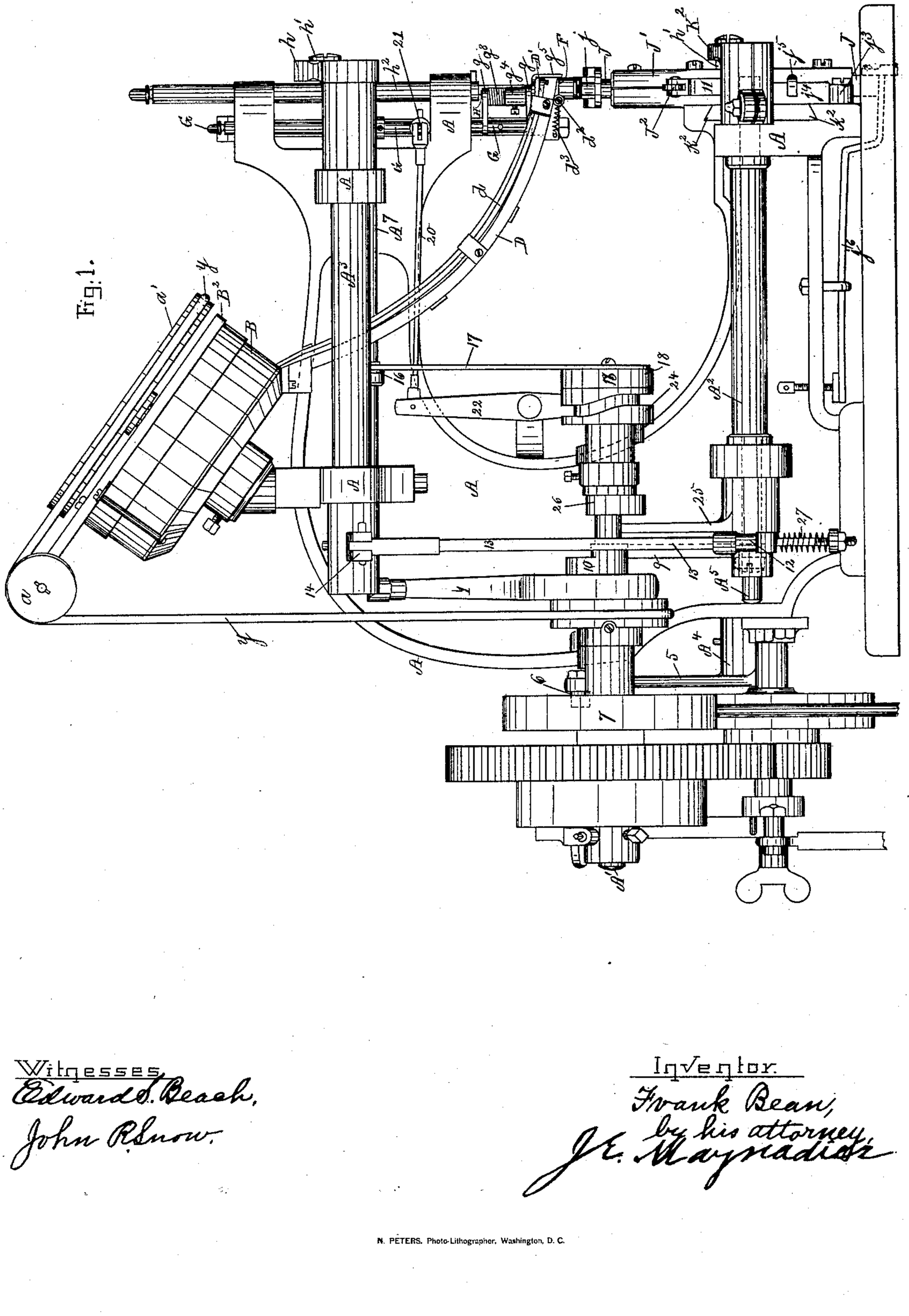
(No Model.) 6 Sheets—Sheet 1.

# F. BEAN.

## MACHINE FOR UNITING SHEET MATERIALS.

No. 367,498. Patented Aug. 2, 1887.

Fig. 1.



Witnesses,
Edward C. Beach,
John R. Snow.

Inventor.
Frank Bean,
by his attorney,
J. E. Maynadier.

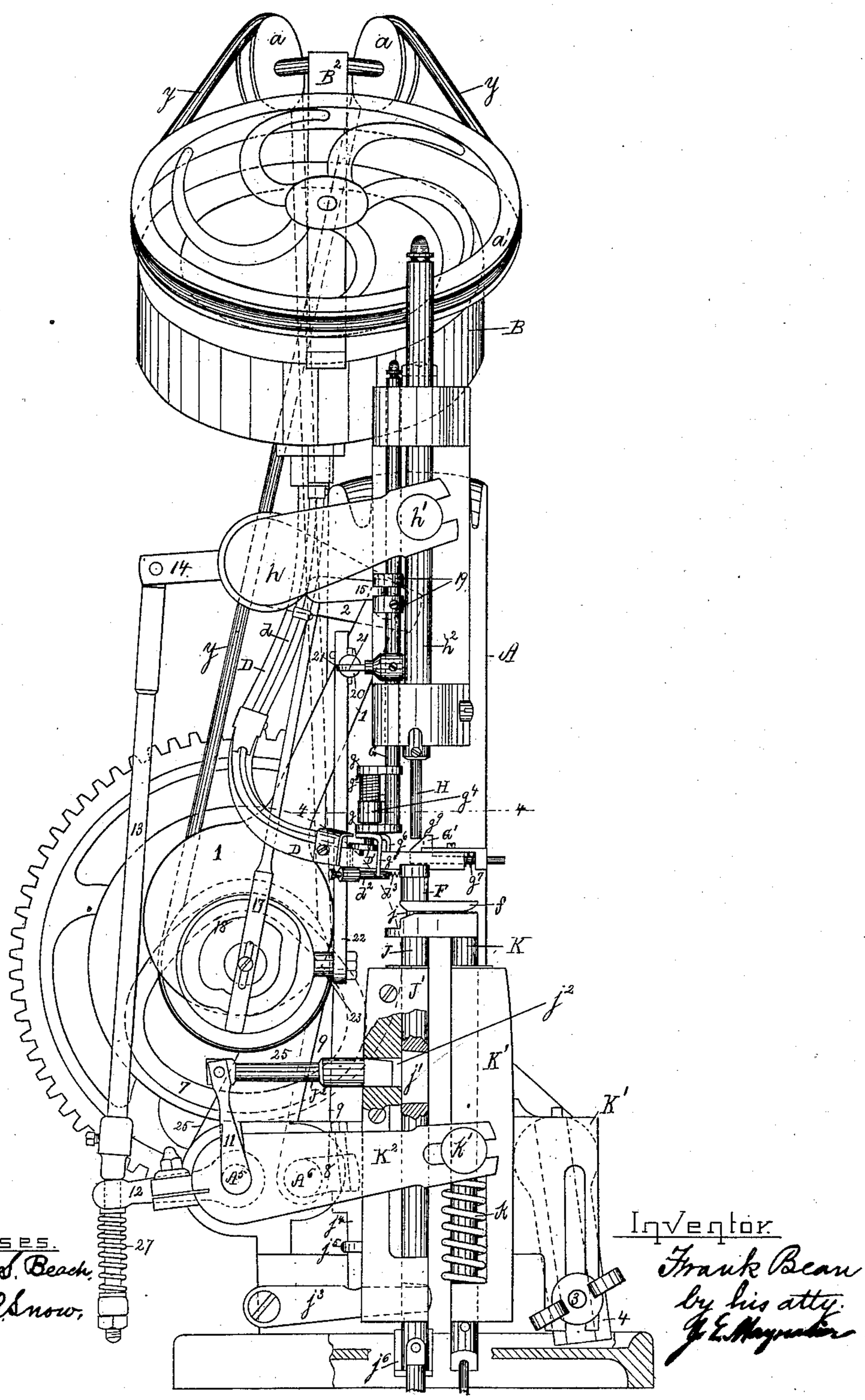
(No Model.) 6 Sheets—Sheet 2.

# F. BEAN.

## MACHINE FOR UNITING SHEET MATERIALS.

No. 367,498. Patented Aug. 2, 1887.

Fig. 2.




Witnesses.
Edward S. Beach.
John R. Snow.

Inventor.
Frank Bean
by his atty.
F. E. Mayrunker

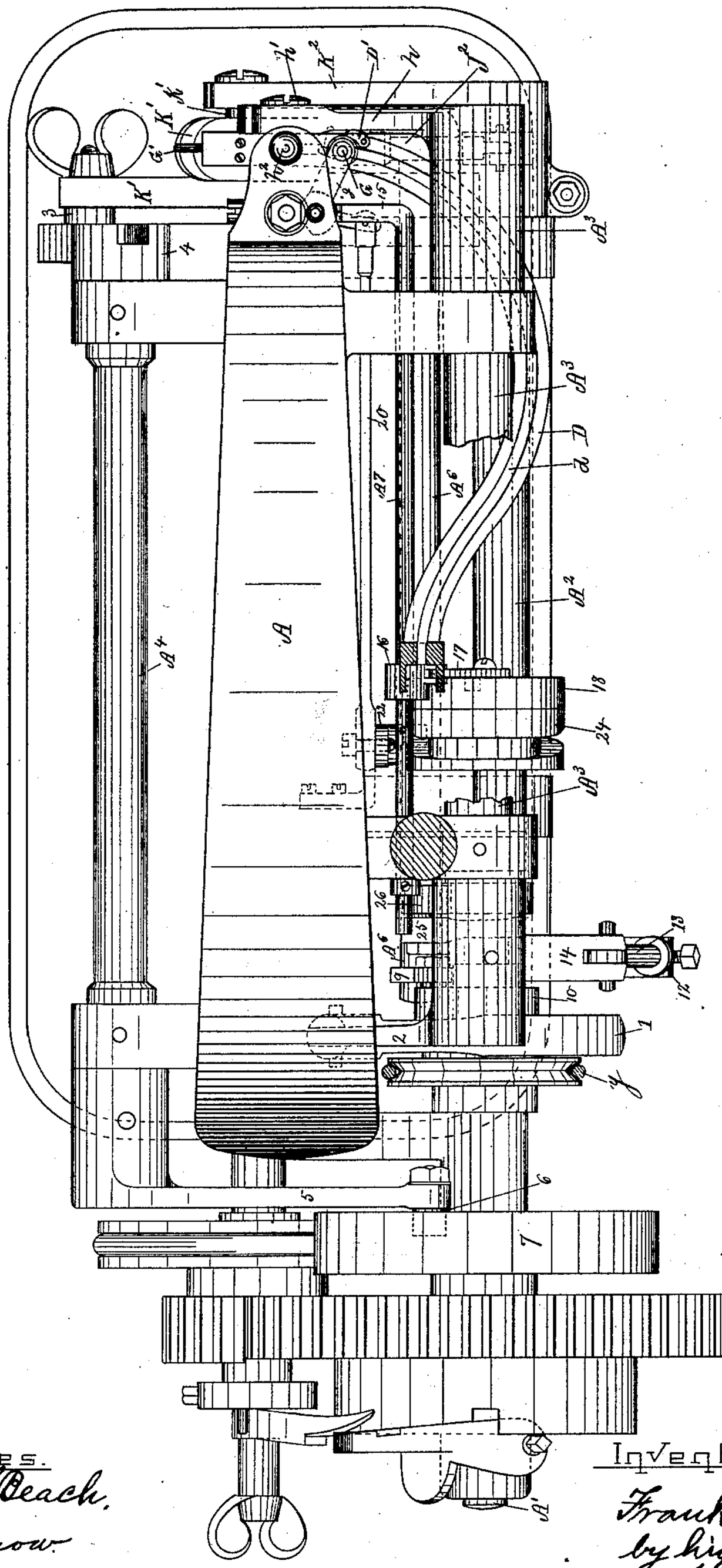
(No Model.) 6 Sheets—Sheet 3.

# F. BEAN.

## MACHINE FOR UNITING SHEET MATERIALS.

No. 367,498. Patented Aug. 2, 1887.

Fig. 3.




Witnesses.
Edward S. Beach.
John R. Snow.

Inventor.
Frank Bean,
by his attorney,
J. E. Maynadier.

(No Model.) 6 Sheets—Sheet 4.

# F. BEAN.

## MACHINE FOR UNITING SHEET MATERIALS.

No. 367,498. Patented Aug. 2, 1887.

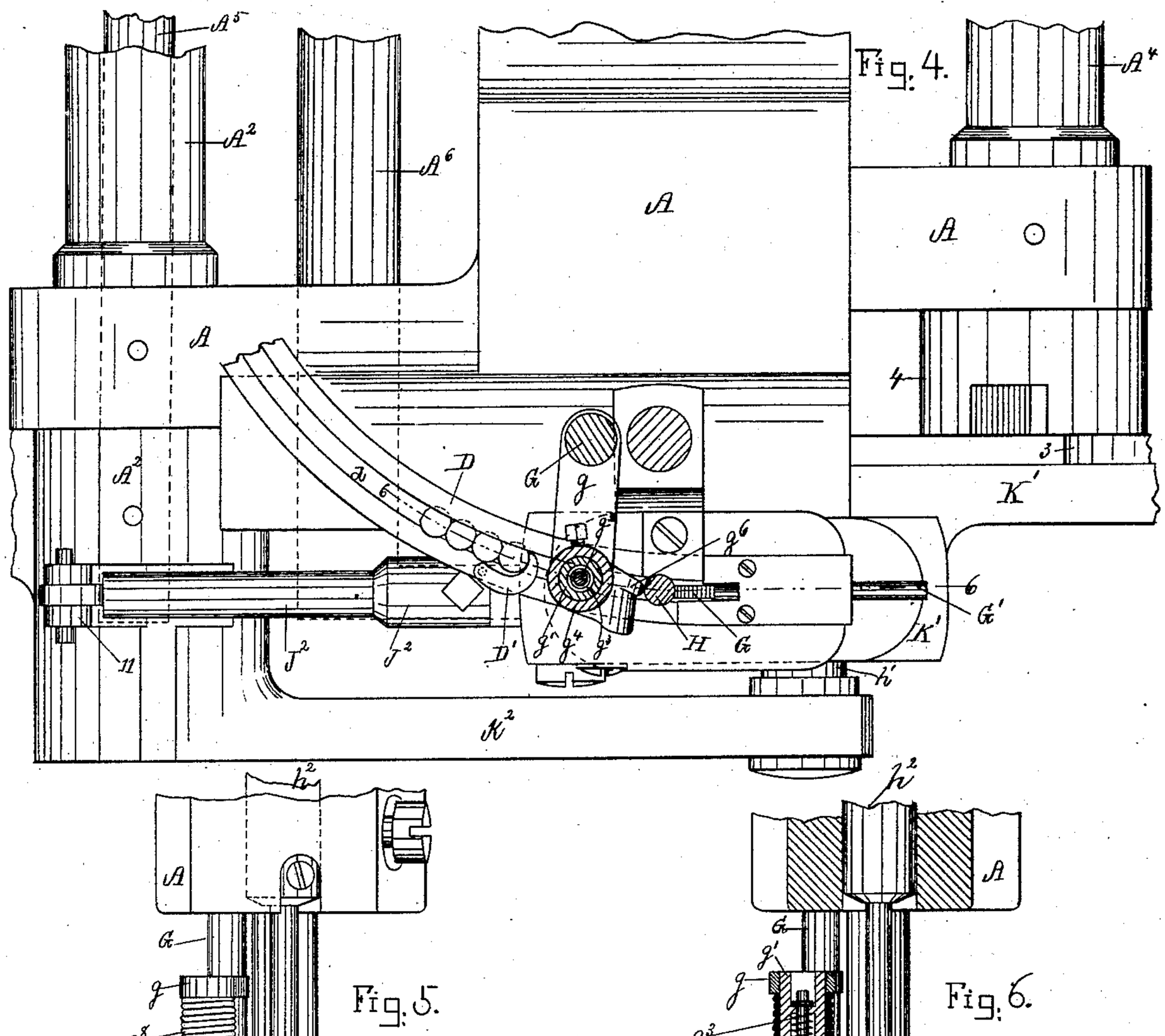



Fig. 4.

Fig. 5.

Fig. 6.

Witnesses.
Edward S. Beach.
John R. Snow.

Inventor.
Frank Bean,
by his attorney.
J. C. Maynadier

(No Model.) 6 Sheets—Sheet 5.

# F. BEAN.

## MACHINE FOR UNITING SHEET MATERIALS.

No. 367,498. Patented Aug. 2, 1887.

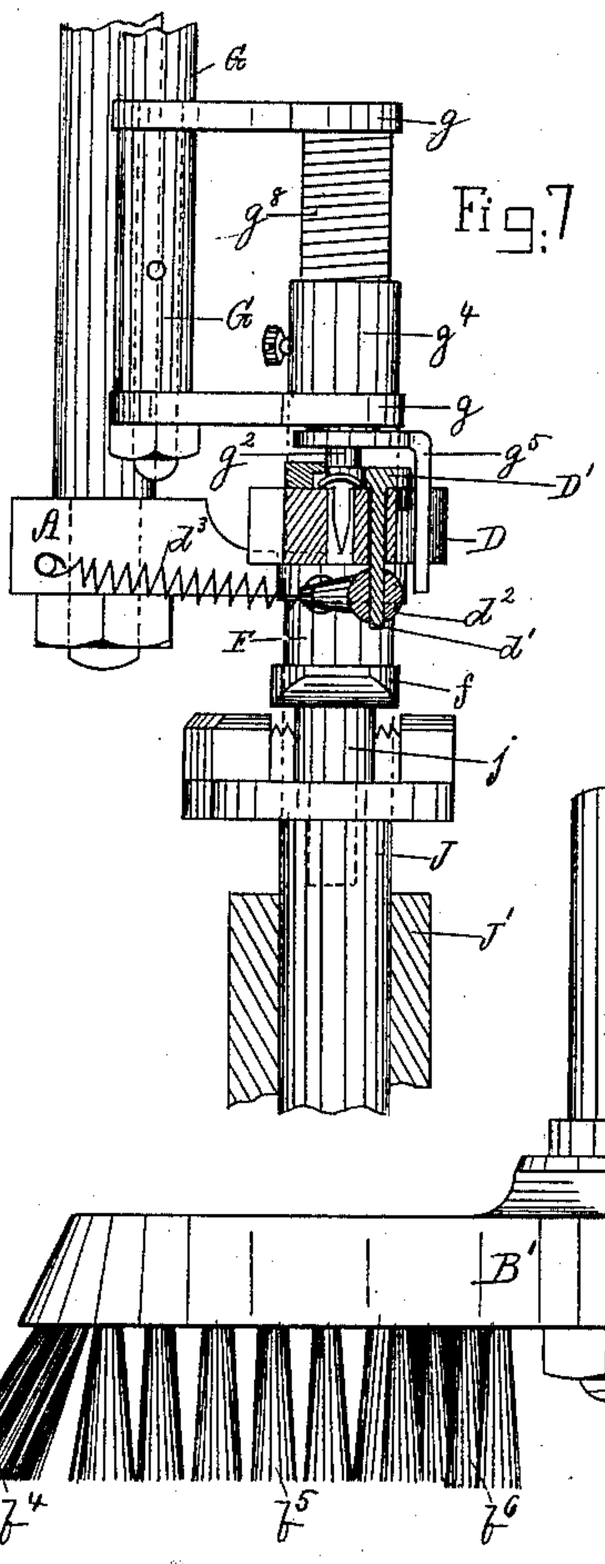
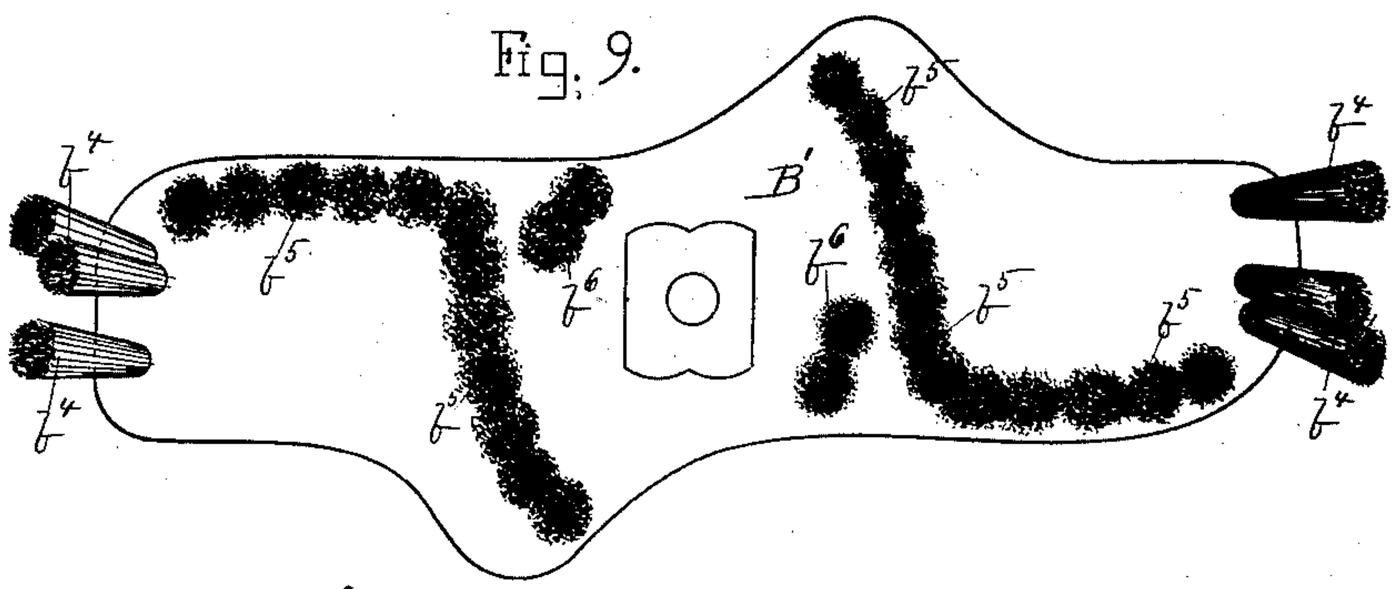



Fig. 7




Fig. 8

Fig. 9.




Witnesses.
Edward S. Beach.
John R. Snow.

Inventor.
Frank Bean,
by his attorney,
J. E. Maynadier

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 6 Sheets—Sheet 6.

# F. BEAN.

## MACHINE FOR UNITING SHEET MATERIALS.

No. 367,498. Patented Aug. 2, 1887.

Fig. 10.

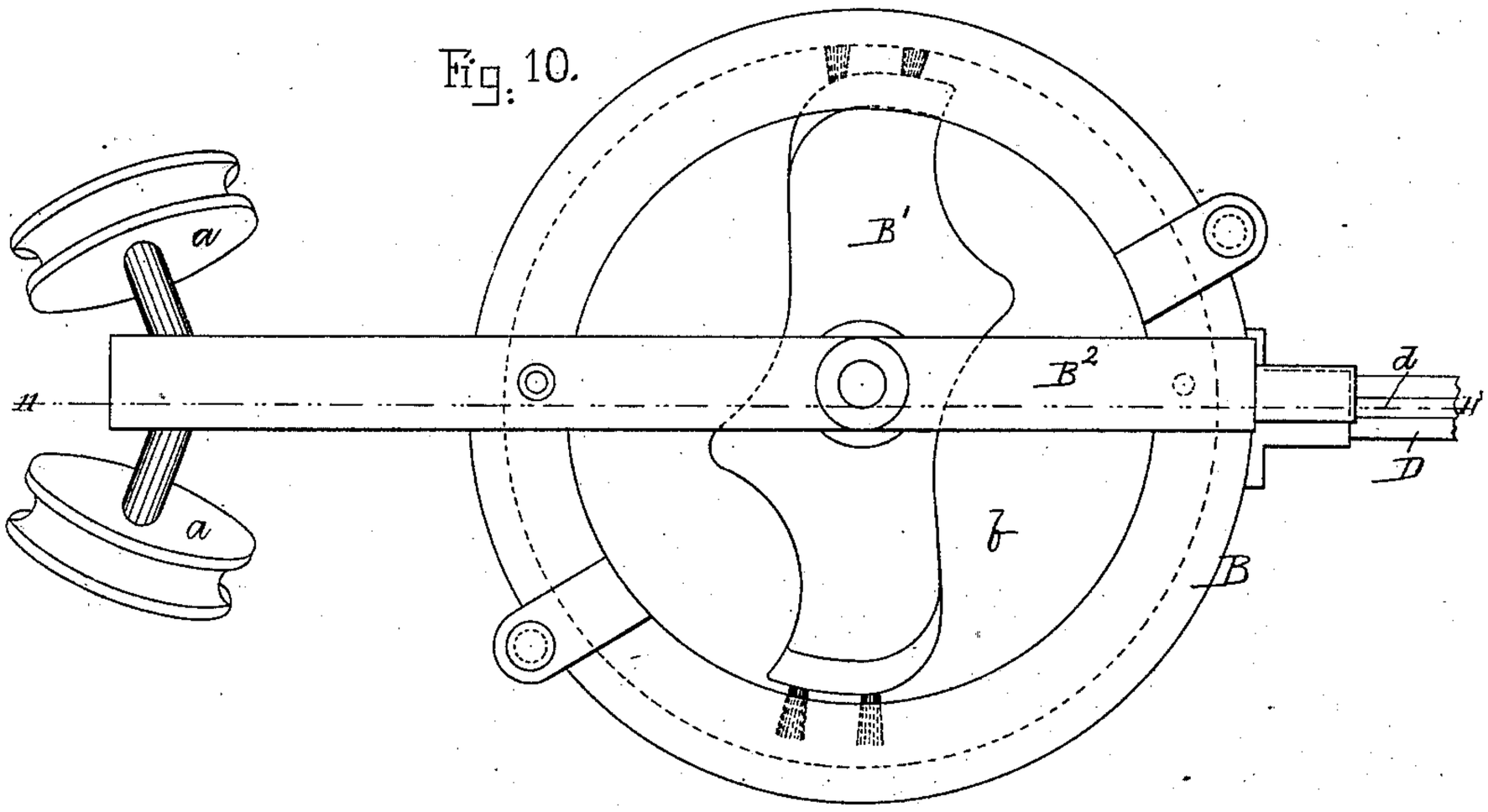



Fig. 11.

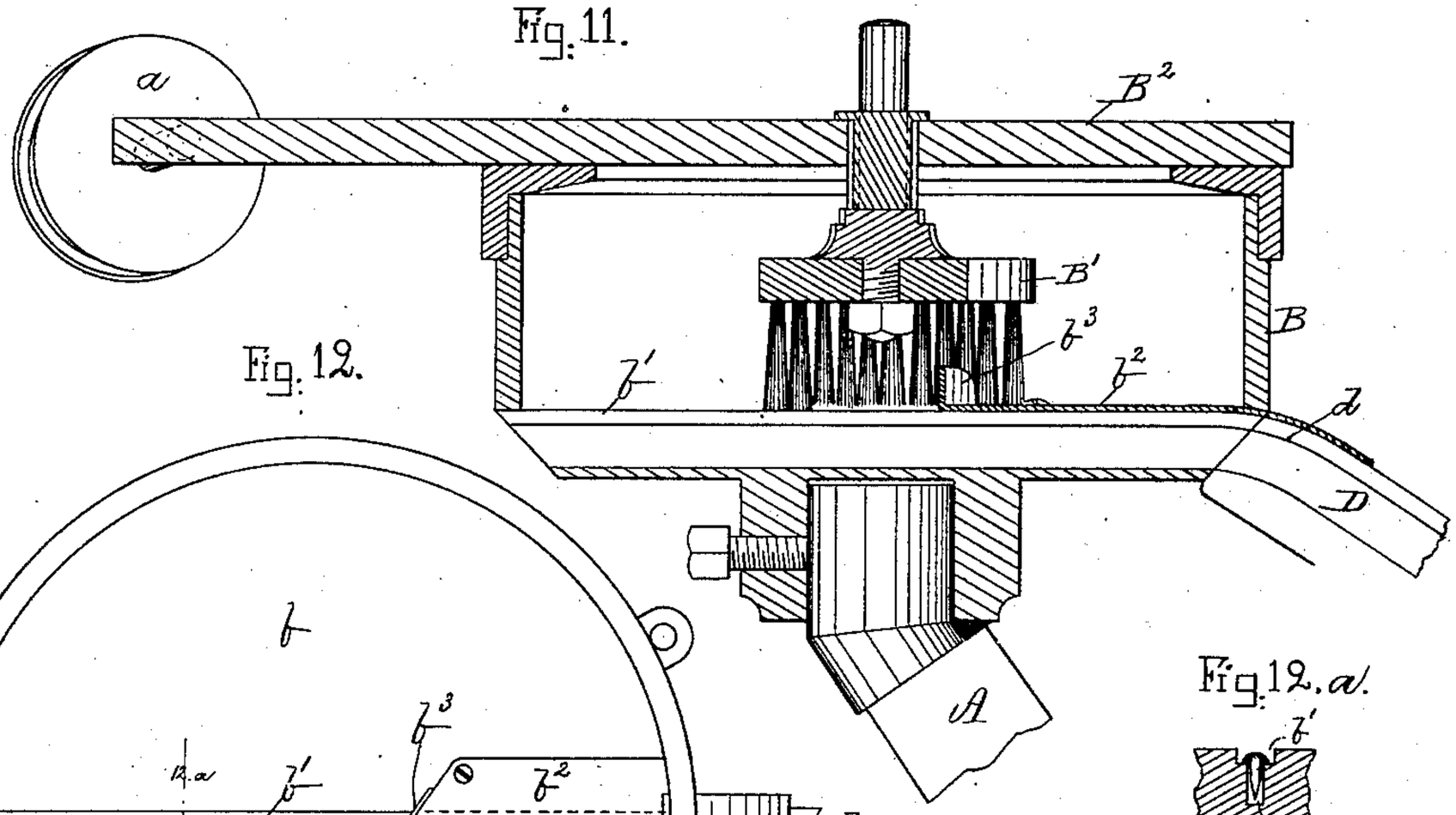



Fig. 12.

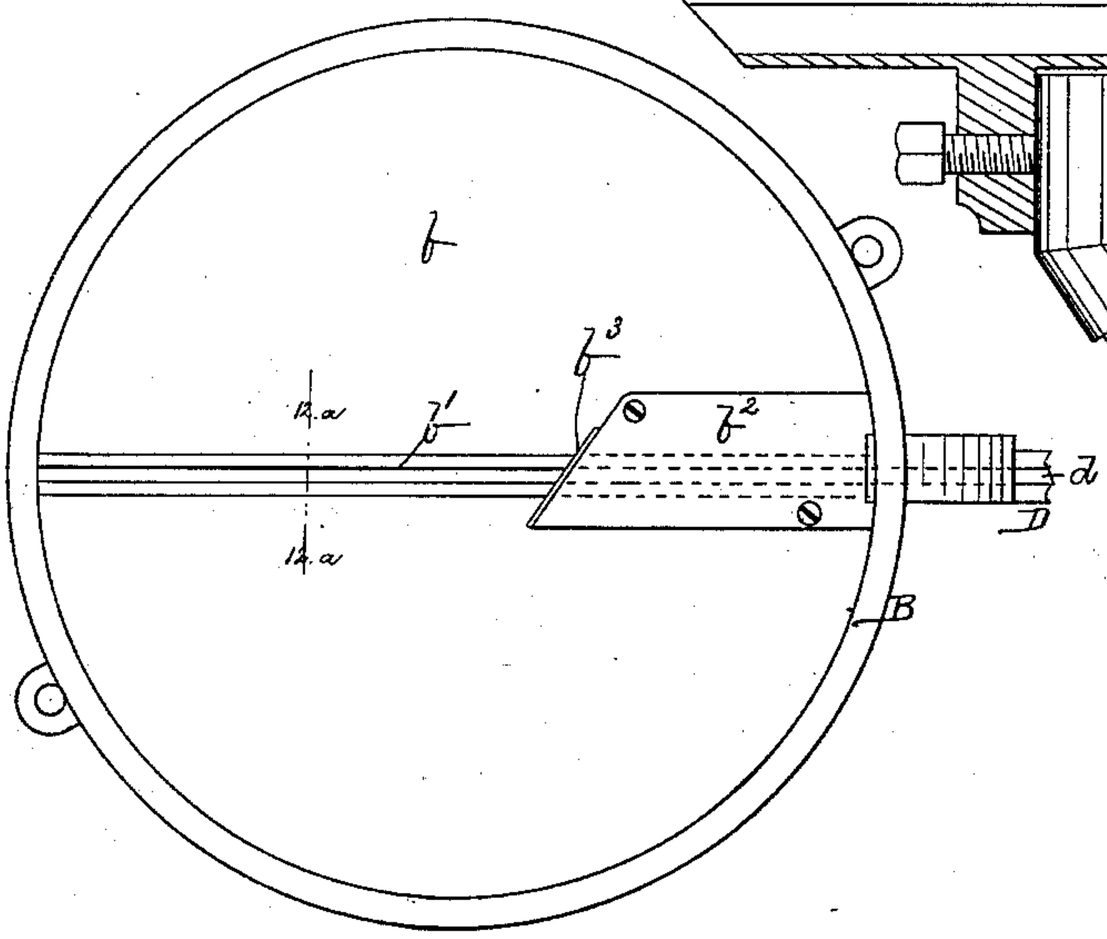



Fig. 12.a.




Witnesses.
Edward S. Beach.
John R. Snow.

Inventor.
Frank Bean
by his attorney,
J. C. Maynadier

# UNITED STATES PATENT OFFICE.

FRANK BEAN, OF MEDFORD, ASSIGNOR OF ONE-HALF TO FRANK D. MARCH, OF CAMBRIDGE, MASSACHUSETTS.

## MACHINE FOR UNITING SHEET MATERIAL.

SPECIFICATION forming part of Letters Patent No. 367,498, dated August 2, 1887.

Application filed April 4, 1887. Serial No. 233,607. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK BEAN, of Medford, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Machines for Uniting Sheet Material, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side and Fig. 2 an end elevation of my machine. Fig. 3 is a plan of the same, with its reservoir broken off for greater clearness. Fig. 4 is a detail, partly in section on line 4 4 of Fig. 2, illustrating the mechanism by which the fastenings are carried into place for the action of the driver. Figs. 5, 6, and 7 are also details, Fig. 6 being a section on line 6 6 of Fig. 4. Fig. 8 is a side view, and Fig. 9 a bottom view, of the preferred form of brush used in my reservoir. Fig. 10 is a plan of my reservoir; Fig. 11, a section of the same on line 11 11 of Fig. 10. Fig. 12 is a plan of the inner surface of the bottom of the reservoir; and Fig. 12ª is a sectional detail on line 12 12 of Fig. 12.

My machine is an improvement on the machine shown in application, Serial No. 213,840, of Albert P. Holman and myself, filed September 17, 1886, and allowed January 18, 1887; and my invention consists in certain combinations of operative parts, hereinafter set forth and claimed.

My machine consists in improved mechanism for sorting the fastenings and arranging them in line in a raceway; in improved mechanism for separating the lowermost fastening from those above it; in improved mechanism for presenting the lowermost fastening to and holding it under the driver until the driver strikes it and carries it down the tube through which it is driven; in improved mechanism for clinching the legs of the fastening, and in improved feed mechanism.

In the drawings, which show my invention embodied in the best way known to me, the frame or head A is provided with a reservoir, B, whose bottom *b* has on its inner surface a groove, *b'*, in line with and opening into the raceway *d* in chute D, which leads from the reservoir to the throat F.

The reservoir is provided with a rotary brush, B', mounted in bar $B^2$, fast to the reservoir, and supporting the idlers *a*, over which belt *y* runs on its way from driving-shaft A' to the pulley *a'*, with which brush B' is provided. By these means brush B' is rotated within the reservoir, and fastenings therein are caused to fall into the groove *b'*, down which they gravitate into the raceway *d*, owing to the inclination of the reservoir, as will be readily understood from the drawings. The groove *b'* has a cover, $b^2$, which extends from that end of the groove *b'* nearest chute D part way to the other end of groove *b'*, and this cover has at its inner end a shield, $b^3$. The purpose of the cover and shield is to prevent fastenings from piling up either at the outlet into the chute or at the inner end of the cover, so as to clog the groove *b'*. For the best results a peculiar form of brush is required for the reservoir. (See Figs. 8 and 9.) The bristles of brush B', which is the preferred form of brush, are arranged as shown (see Fig. 9)—that is, with bristles in tufts $b^4$ at the end of the brush in lines, $b^5$, approximating the letter L on either side of the vertical axis of the brush and in tufts $b^6$ near the angle formed by the lines $b^5$, the L-shaped portions of the brush being inverted in respect of each other. By means of a brush thus formed fastenings in the reservoir are swept over groove *b'* and are given time to fall into the groove, and the passing of the tufts $b^6$ past and against shield $b^3$ keeps the fastenings from lodging against its inner face. But it will be plain that such a brush, or the equivalent of it, is not absolutely essential in my reservoir, for its bottom is fixed and is inclined in respect of a vertical line through it, so that the groove *b'* opens into raceway *d* and fastenings in the groove gravitate to the throat F.

As my machine is specially intended for use in driving a peculiar kind of fastening, forming the subject-matter of my application, Serial No. 232,117, executed February 16, 1887, the groove *b'* is countersunk or shaped as shown in diagram Fig. 12ª, to prevent the heads of the fastenings from falling into the lower part of the groove.

The brush B' is mounted at one side of the axis of the reservoir, as shown, in order that tufts $b^6$ may move in the circle of the front face of the shield as the brush rotates, and so

remove all superfluous fastenings out of groove $b'$.

Near the lower end of chute D, Figs. 4 and 6, between reservoir B and throat F, is a finger, D′, carried by a pin, $d'$, mounted in a vertical bore through chute D, and provided with a rigid arm, $d^2$, the free end of which is connected to a stationary part of the machine by a spring, $d^3$. This spring $d^3$ keeps the finger D′ across the raceway $d$ to arrest the fastenings in their descent from the reservoir.

The vertically-reciprocating rock-shaft G carries my improved mechanism for separating the lowermost fastening in raceway $d$ from the fastenings above it, and in its arms $g$ is mounted a hollow sleeve, $g'$, in which is mounted a plunger, $g^2$, backed up by a spring, $g^3$, sleeve $g'$ being kept in its bearings by the sleeve $g^4$, fast to it, and being provided with two fingers of unequal length, the longer finger, $g^5$, lying against one side of chute D, while the shorter finger, $g^6$, is adapted to reciprocate vertically into and out of raceway $d$ and to carry a fastening against the inner end of plunger G′, which is mounted in chute D on that side of nail-tube F opposite finger $g^6$, and is backed up by a spring, $g^7$, and is adapted to move over throat F and away from it. In order to keep the longer finger, $g^5$, at all times against the side of chute D, so as to keep the shorter finger, $g^6$, in position to reciprocate into and out of raceway $d$ without striking against the walls of the raceway $d$ or the top surfaces of chute D, a spring, $g^8$, is provided, and one end of this spring is fast to an arm, $g$, while the other end is fast to sleeve $g^4$.

In the machine described in the said application of Holman and myself the top surface of plunger G′ forms a right angle with the inner face of the plunger, and the consequence is that the machine cannot be run without breaking when for any reason a fastening is not swept against the inner end of the plunger G′, because the spring $g^7$ back of the plunger G′ causes the plunger to cover the throat F when a fastening is not against the inner end of the plunger.

In my improved machine the top surface of the head of plunger G′ is beveled at $g^9$, whereby the descending driver pushes the plunger back against its spring $g^7$, that is away from throat F, when the the machine happens to be run without fastenings being in it or when an imperfect fastening sticks in the raceway and no fastening is carried against the inner end of plunger G′.

For the best results I find it necessary that the anvil should be supported positively during the clinching operation, and I accordingly mortise bar J, supporting anvil $j$ at $j'$, and block J′, in which the anvil-bar J reciprocates at $j^2$, and provide a bolt, $J^2$, which is adapted to enter the mortises $j'$ just before the clinching operation takes place, and to remain there until the fastening driven has been clinched; and in order to adapt this part of my machine for stock varying in thickness I bevel the upper surface of bolt $J^2$ and cut the upper end wall of mortise $j'$ on a line to correspond, so that bolt $J^2$ readily enters mortise $j'$, and the distance of its stroke into mortise $j'$ is governed by the thickness of the stock in the machine, as will be readily understood from what is said below.

Bolt $J^2$ is carried by an arm, 11, fast to rock-shaft $A^5$, which is mounted in hollow rock-shaft $A^2$, rock-shaft $A^2$ being mortised (see Fig. 4) to allow arm 11 to project and have sufficient play to thrust bolt $J^2$ into and withdraw it from mortise $j'$ in anvil-bar J. The inner end of bolt $J^2$ is supported in mortise $j^2$ in block J′. In order that the bolt $J^2$ may not be shot forward positively and the machine be thereby injured in case the upward movement of anvil-bar J should not be exactly timed to bring mortise $j'$ opposite the end of bolt $J^2$ at the moment bolt $J^2$ ought to enter mortise $j'$, I provide the spring 25, whereby the bolt $J^2$, when brought against the edge of anvil-bar J by the rocking of shaft $A^2$, is not driven positively against the edge of anvil-bar J, but by reason of the yielding of spring 25 remains stationary until the mortise $j'$ is in place to receive it, when it is shot forward into the mortise by the resiliency of spring 25.

Anvil-bar J is connected with an arm, $j^3$, which is pinned at one end to frame A, and block J′ is provided with a slide-block, $j^4$, in guide $j^5$, and this block $j^4$ is moved, as hereinafter explained, to bear against arm $j^3$, and thereby to move anvil-bar J downward against the force of spring $j^6$.

The feed-bar K is mounted in a block, K′, which is adapted to slide horizontally in ways $k^2$ in the main frame, as in the machine described in said application of Holman and myself, and is moved downward in its bearings in block K′ by means of an arm, $K^2$, from rock-shaft $A^2$. In order to adapt my feed for stock varying in thickness in a better way than has heretofore been accomplished in this class of machines, I provide feed-bar K with a spring, $k$, against the face of which the feed-bar is moved by the arm $K^2$. Spring $k$ is preferably a spiral spring surrounding the feed-bar and lying between a shoulder on block K′ and the stud $k'$, (see Fig. 2,) which connects arm $K^2$ to feed-bar K.

The operation of my machine is as follows: Starting with driver H up, finger $g^6$ and plunger G′ holding a fastening over throat F, and plunger $g^2$ on the head of the fastening next back of the fastening over the nail-tube, (see Fig. 6,) stock is inserted between the feed-plate on feed-bar K and foot $f$, the anvil and feed-bars being depressed by means of treadles or the like for that purpose, as indicated in Fig. 2. As driver H descends to drive the fastening under it through throat F by motion given it from main shaft A′ through the eccentric-strap 1 of arm 2 from rock-shaft $A^3$ and arm $h$, connecting rock-shaft $A^3$ and stud $h'$ on driver-bar $h^2$, block K′, carrying feed-bar K, is slid in ways $k^2$ toward nail-tube F to

feed the stock by means of rock-shaft $A^4$, to which block K′ is connected by adjustable stud 3 and arm 4, fast to shaft $A^4$, the shaft $A^4$ being rocked by the arm 5, having a roll, 6, in a groove in cam 7 on main shaft A′, anvil-bar J being moved, to allow the feed to take place, away from foot *f* against the force of spring $j^6$ by means of lever $j^3$, slide $j^4$, arm 8 (see dotted lines in Fig. 2) from rock-shaft $A^6$, which is rocked by its cam-arm 9 engaging cam 10 on main shaft A′. Before driver H completes its downstroke anvil-bar J is carried up against the stock by the resiliency of spring $j^6$, and as it moves up bolt $J^2$ enters mortise $j'$ and locks the anvil-bar during the clinching operation, the bolt $j^2$ being moved in and out of mortise $j'$ by means of arm 11 from rock-shaft $A^5$, mounted in hollow rock-shaft $A^2$, by arm 12 and spring-controlled arm 13, connecting rock-shaft $A^5$ with arm 14 of rock-shaft $A^3$. The descent of driver H forces the fastening through the stock and the legs of the fastening into the grooves in the face of the anvil, so that the points of the legs are turned back into the stock and clinched. Just before the clinching operation takes place vertical rock-shaft G is moved up by means of arm 15 from rock-shaft $A^7$, to whose arm 16 is connected cam-rod 17, having a roll in a groove in cam 18 on main shaft A′, the free end of arm 15 engaging shoulder 19 on shaft G, and shaft G is rocked to bring plunger $g^2$ into position to descend upon the head of the fastening which is against finger D′ by means of a rod, 20, connecting arm 21 of shaft G to one end of lever 22, whose other end has a roll, 23, in cam 24 on main shaft A′. The feed-bar K is then moved away from plate *f* against the force of spring *k* by means of arm $K^2$, which connects stud *k*′ on feed-bar K to rock-shaft $A^2$, which is rocked by means of an arm, 25, engaging open cam 26 on main shaft A′, and then away from nail-tube F by the rocking of shaft $A^4$, as above explained, and before it completes its motion away from tube F plunger $g^2$ descends to engage the head of the fastening just back of finger D′, and finger $g^5$ enters the raceway back of the lowermost fastening in the raceway, the driver H rising, bolt $g^2$ moving out of its mortise, the anvil-bar moving away from feed-plate *f*, the feed taking place as before, and the plunger $g^2$ and finger $g^5$ each carrying a fastening nearer the nail-tube by the rocking of shaft G.

What I claim is—

1. In a machine for uniting sheet material, a reservoir having a fixed inclined bottom which has a groove opening into a raceway, in combination with cover $b^2$, substantially as and for the purpose set forth.

2. In combination, chute D, finger D′, and a plunger, $g^2$, and mechanism, substantially such as described, for moving the plunger vertically and sidewise, substantially as and for the purpose set forth.

3. In combination, chute D, throat F, driver H, with plunger G′, beveled on its upper surface, substantially as and for the purpose set forth.

4. In combination, vertically-reciprocating anvil-bar J, mortised at $j'$, bolt $j^2$, and means, substantially such as described, whereby the bolt is shot into and withdrawn from the mortise in the anvil-bar, substantially as and for the purpose set forth.

5. In a machine substantially such as described, the herein-described improvement in feeding mechanism, consisting in the combination of a horizontally-reciprocating feed-bar, K, with means, substantially such as described, for moving it away from a foot, *f*, and with a spring which moves it against its foot *f*, substantially as and for the purpose set forth.

FRANK BEAN.

Witnesses:
EDWARD S. BEACH,
JOHN R. SNOW.