Sheet 1 - 4 Sheets.

A. B. Taylor.

Forming Bals.

No. 14476 Patented Mar. 18, 1856.

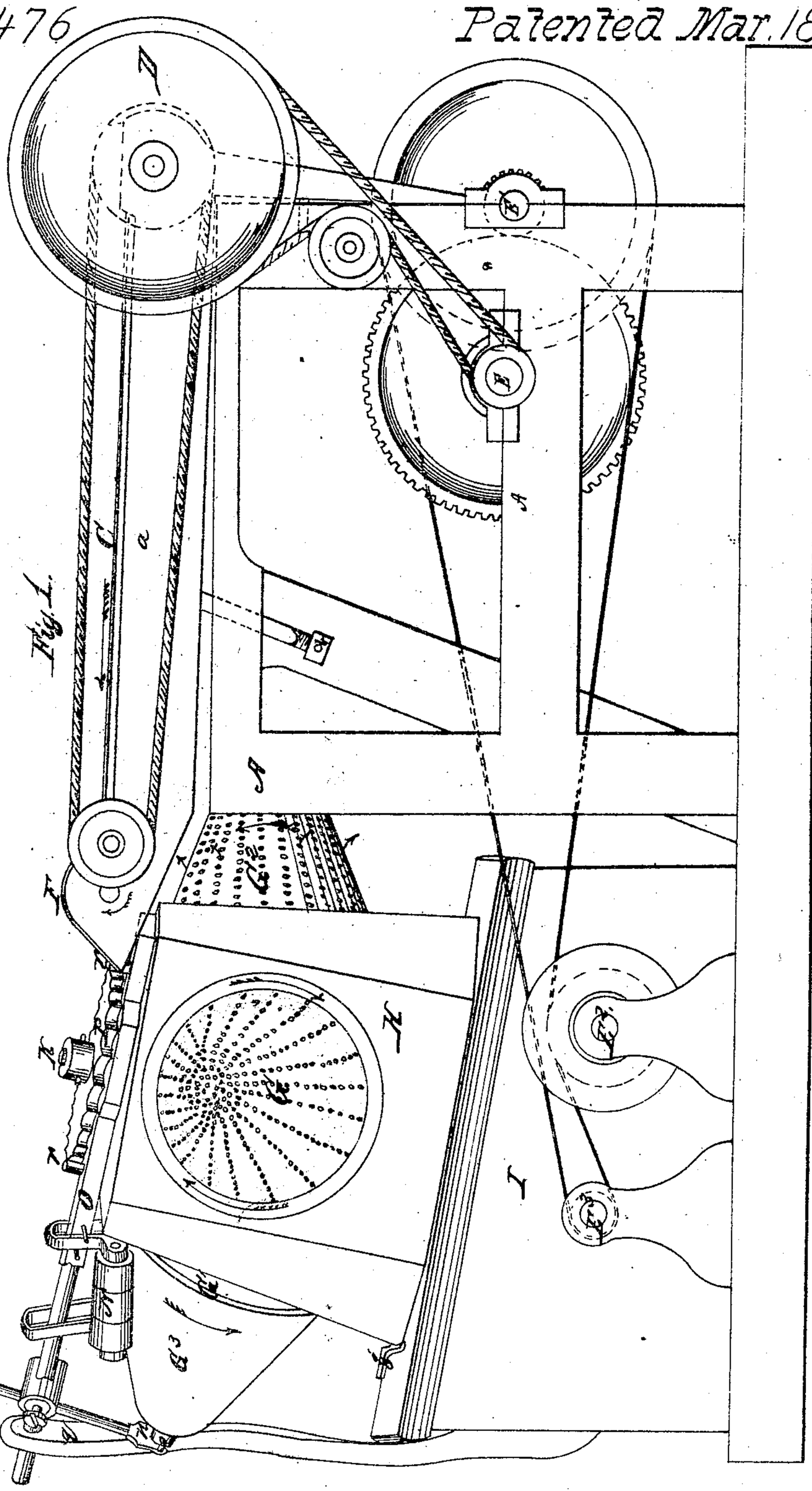


Fig. 1.

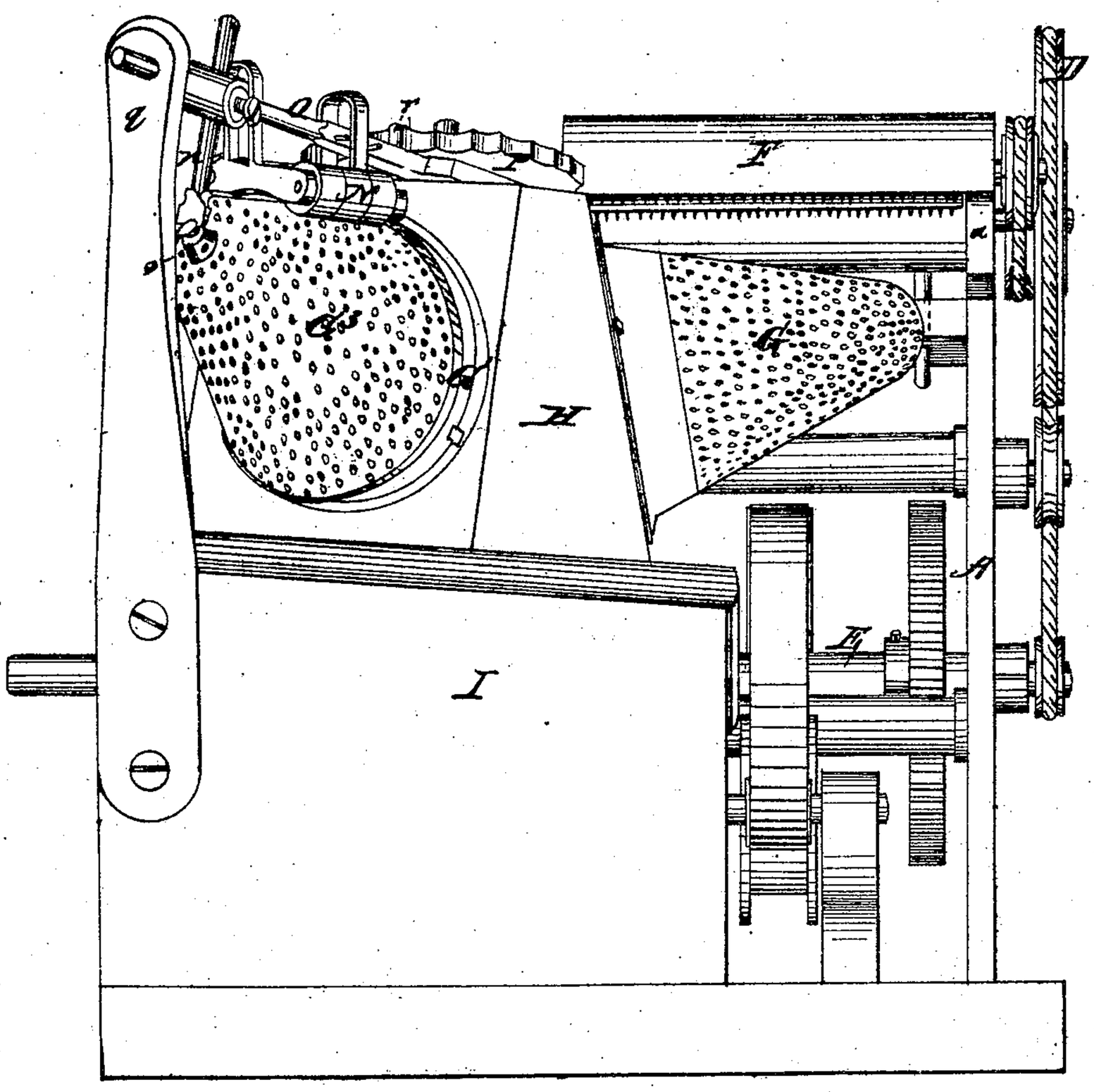
Sheet 2-4 Sheets

A. B. Taylor.

Forming Bats.

No. 14476 Patented Mar. 18, 1856

Fig. 2.



Sheet 3-4 Sheets.

A. B. Taylor.

Forming Bats.

No. 14476 Patented Mar. 18, 1856.

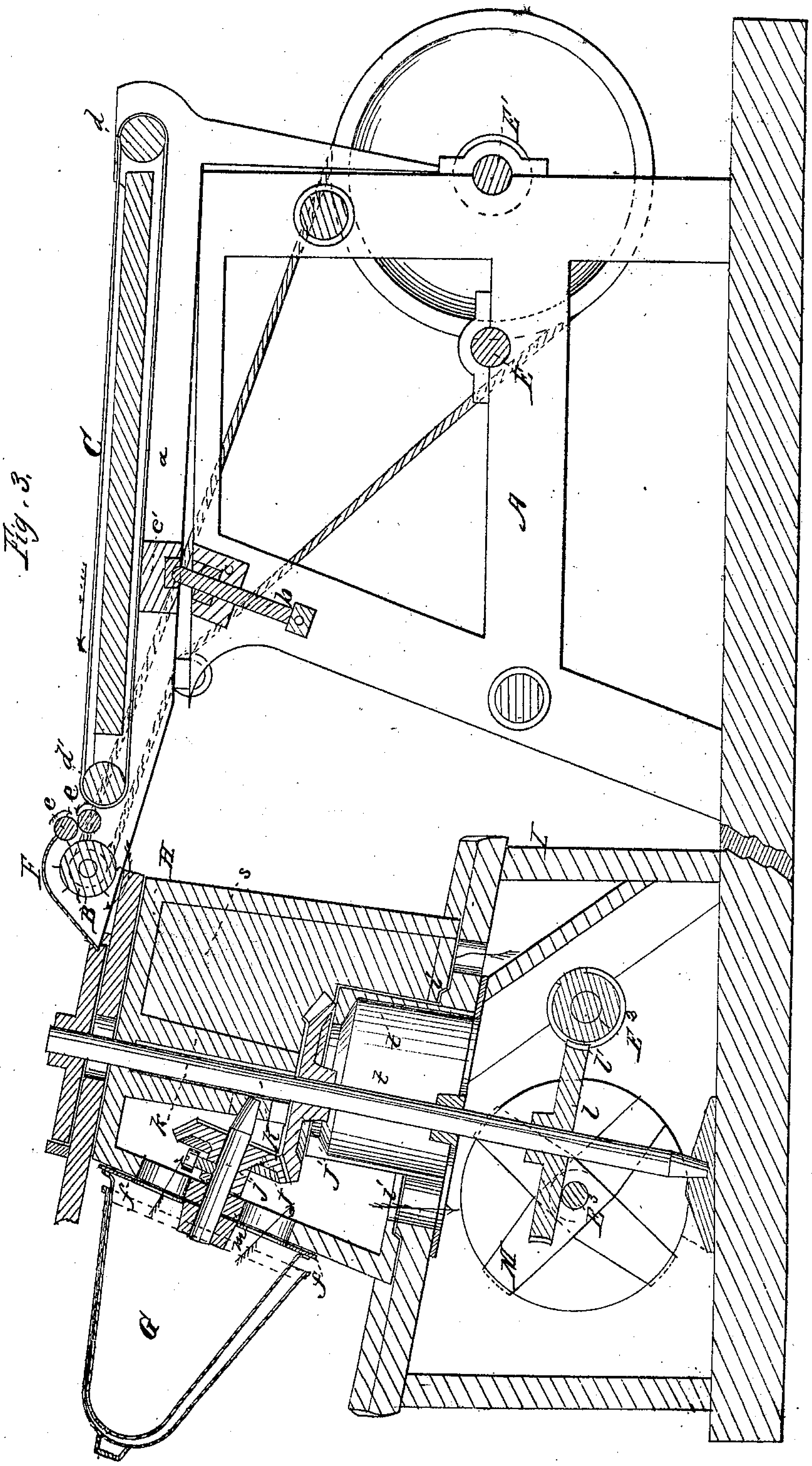


Fig. 3.

Sheet 4 - 4 Sheets

A. B. Taylor.

Forming Bats.

No. 14476 Patented Mar. 18, 1856

Fig. 4.

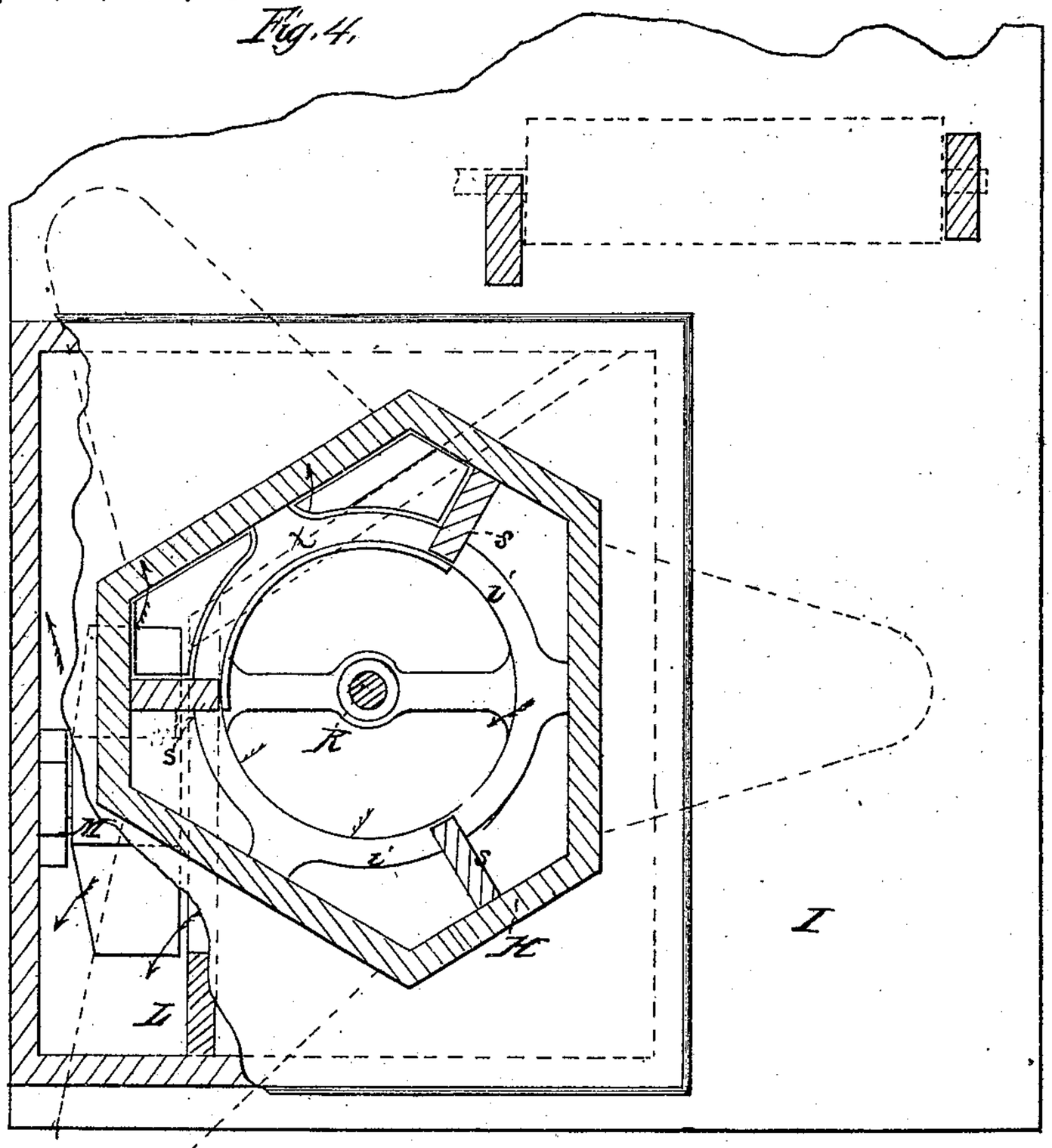
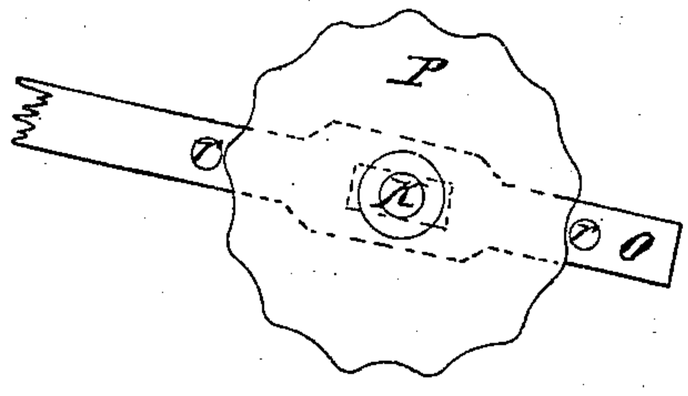


Fig. 5.



UNITED STATES PATENT OFFICE.

ALVA B. TAYLOR, OF NEWARK, NEW JERSEY.

MACHINERY FOR MAKING HAT-BODIES.

Specification forming part of Letters Patent No. 14,476, dated March 18, 1856; Reissued August 21, 1860, No. 1,030.

To all whom it may concern:

Be it known that I, ALVA B. TAYLOR, of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in the Machinery and Process of Manufacturing Hat-Bodies; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the drawings which are hereto annexed, and in which—

Figure 1 represents a side elevation of my improved hat body machinery; Fig. 2 is an end elevation of the same; Fig. 3 is a vertical section thereof; Fig. 4 is a plan of the fan case and draft box, certain portions being removed to show the interior arrangement of the parts; and Fig. 5 is a plan of the scalloped edged wheel and reciprocating bar.

Various machines have been constructed for manufacturing hat bodies which operate upon the general plan of first disseminating the fur or other stock in a flocculent state in the air and afterward collecting it upon the surface of a perforated conical former by means of the currents of air induced by exhausting the air from within the cone.

When flocculent fur has been collected upon a perforated cone in the form of a bat it is necessary to harden it, in order to permit it to be handled and to fit it for the subsequent processes. In manufacturing hat bodies by hand, the hardening of the bat is effected by wrapping it in a moist linen cloth and working it by hand. In the manufacture by machinery it is expedient to harden the bat before it is removed from the perforated cone so that it may be handled without danger of injury. This hardening has been effected by means of water, applied either in the form of a shower or jets, or in that of a bath into which the cones with the bats upon them are dipped. Although this method of hardening is effected with much less labor than the hand process, it is attended with the defect, that the bats are soaked with water; and although the water is removed to a considerable extent by squeezing the bats, enough nevertheless remains to cause the souring and injury of the bats. The process of hardening by means of water also injures the color of the finer qualities of fur; moreover hat bodies hardened by the wet process are not as well fitted for the subsequent operations required to convert them into hats.

The object of my improvements is to harden the bat sufficiently to permit it to be removed from the perforated cone without the application of water; and to facilitate the removal of the bat from the cone without requiring the latter to be taken from its position in the machine.

These improvements consist, in a mechanical process of hardening the bat before it is removed from the cone, and in facilitating the removal of the bat from the cone by means of a blast of air forced through the cone. There are also various improvements in the arrangement and construction of the machinery devised by me which will hereinafter more fully appear.

In the accompanying drawings A is the frame of the picker, upon which the picking cylinder and the feed motion are mounted, and to which the shafts are secured by means of which motion is imparted to the various parts of the machine. The upper portion, *a*, of this picker frame is made separate from the lower, and is attached to the latter by hinges or pivots so that the end of the upper portion of the frame, at which the picking cylinder, B, is situated, can be raised or depressed to adjust the position of the picking cylinder to perforated cones of different dimensions. This adjustment of the upper portion of the picker frame is effected by turning a screw *b* which passes through a nut that is made fast to a cross bar *c* of the lower portion of the picker frame, and bears against a cross bar, *c'*, that connects together the sides of the upper portion of the picker frame. The upper portion of the frame is steadied and guided as it is raised or depressed by guide pins which project downward from the upper cross bar *c'* through corresponding holes in the lower cross bar *c*.

The feed motion consists of an endless band or apron, C, which runs upon two rollers, *d d'*, situated near the opposite extremities of the upper portion *a* of the picker frame. One of these rollers *d* has a pulley wheel D, secured to its axle to receive a belt by which a rotary motion is imparted to the roller from the main shaft E, at the lower part of the frame. The feed apron conveys the stock to a pair of feed

rollers, *e e*, which are situated immediately in front of the picking cylinder B. Motion is imparted to the lower of these feed rollers from the shaft of the feed apron roller *d* by means of a belt, which encircles a belt pulley secured to the shaft and a corresponding one upon the axle of the feed roller. The upper roller is driven from the lower by means of a pair of pinions, whose teeth engage and which are secured to the axles of the respective feed rollers. In order that the feed rollers may grip the fur more securely, the upper one should be pressed toward the lower by springs or weights, and the barrels of the two rollers should be slightly fluted.

The picking cylinder B, which revolves in close proximity with the feed rollers, has its barrel studded with teeth which act upon the fur presented to them by the rollers. It should be driven at a high speed; and in the machine represented in the accompanying drawings motion is imparted to it from the counter shaft E′ by means of a belt which encircles a suitable belt pulley secured to the shaft and a corresponding belt pulley upon the shaft of the picking cylinder. The counter shaft E′ is driven from the main shaft by means of cog wheels secured to the respective shafts. The picking cylinder revolves in the direction indicated by the arrow placed beneath it in Fig. 3, and it is covered with a cap or case F, which extends its whole length and acts as a deflecting plate to cause the fur, which naturally tends to adhere to the picking cylinder to pass off from the latter in the direction indicated by the red arrows in Fig. 1. It also prevents the stock upon the feed apron from passing accidentally over the upper feed roller.

The perforated cone, G, which receives the fur from the picking cylinder, forms one of a series of three G, G′, G², which project radially from a pyramidal draft box H. This draft box is supported by a fan case I, which is sufficiently large to form a firm base for the draft box as well as to contain the fan by which the draft is maintained through the perforations of the cones. The draft box has a collar plate *i* at its bottom which fits loosely upon a corresponding collar on the top of the fan case I beneath the draft box, in such manner that the draft box with the cones upon it can be turned upon its axis to bring each cone in turn in the proper position to receive the flocculent fur from the picking cylinder. In order to hold the draft box, with the cones upon it, stationary until the proper quantity of fur is collected upon the cone opposite the picker, one of its corners is engaged with a spring catch *g*, which is secured to the top of the fan case. The circular space within the collar plates is open so as to permit a free draft from the interior of the draft box to the fan case beneath. A circular opening is also made in each face of the draft box behind the base of each perforated cone, so as to permit the draft to be drawn through the cone into the draft box.

Each perforated cone is made fast by a rim at its base to a ring plate *f*, whose face is sufficiently broad to receive perforated cones of the various sizes used in the manufacture of hat bodies; and the ring plate is secured to a short shaft *j*, that projects radially outward from the axis of the draft box. The inner journal of each of these radiating shafts is supported in a hub *k* at the center of the draft box, and the outer journal of each shaft is supported by a bridge tree *m*, which crosses the opening in the face of the draft box. The radiating shafts are fitted with beveled wheels J whose teeth engage with those of a corresponding beveled wheel J′, that is secured to an upright shaft K, passing through the hub of the draft box. This upright shaft extends upward sufficiently to pass through, and project a short distance beyond the top of the draft box; it also extends downward into the fan case beneath, where it is fitted with a worm wheel *l* to which motion is imparted by a worm *l′* upon a horizontal shaft E².

The fan M by which the draft is maintained is of the screw variety. It is situated at the mouth of a circular opening in a partition L, which crosses the fan case and divides it into two parts, the larger of which communicates by the opening in the collar plates with the draft box above, while the smaller communicates with an air trunk situated beneath the floor of the factory, so that the air drawn from the perforated cones through the draft box and larger compartment of the fan case is discharged into the smaller compartment, from which it escapes through the air trunk. The fan shaft E³ is fitted with a belt pulley and is driven from the countershaft E′ of the picker frame by means of a belt which also passes over a pulley upon the worm shaft E² and drives the latter.

The axis of the draft box is inclined, in order that when the draft box is turned upon the collar plates the perforated cones may readily pass beneath the picking cylinder; the draft box is also set close to the picker frame, so that the perforated cone upon which the fur from the picker is received is separated by no greater space from the latter than is necessary to permit the perforated cones to pass the picker frame when the draft box is turned. The inclination of the axis of the draft box requires a corresponding inclination in the upright shaft K, which is sufficient to permit the teeth of the

worm wheel to work freely in the worm without requiring them to be skewed.

As has been stated, there are three perforated cones G, G′, G², upon the draft box; one of these G, Figs. 1 and 2, is in the proper position to recive the fur delivered by the picking cylinder, being opposite thereto and extending lengthwise therewith, that portion of the conical surface which is nearest to the picking cylinder being slightly oblique thereto as shown in the accompanying drawings. This position of the cone with reference to the picker is attained by setting the radiating shaft *j* at a suitable inclination to the upright shaft K, and the draft box is made of pyramidal form, in order to accommodate its sides to the position of the base of the cone. Of the other two cones, one, G′, is in a proper position for the hardening of the coating of fur, or bat, which has collected upon it. This hardening is effected by the combined action of pressure and motion. The pressure is imparted by means of a conical cover G³ which lies loosely upon the bat, upon which cover a series of weighted rollers N rest. A rapid reciprocating movement is imparted to the cover by means of a bar O, which slides radially to and fro across the top of the draft box. The outer extremity of this reciprocating bar is fitted with an arm *n*, that projects downward and is received in a ring groove which is formed in a boss *o* secured to the head of the cover. The inner half of the reciprocating bar has two pins *r*, *r′*, protruding from its upper face, which are acted upon alternately by the scalloped rim of a wheel P that is secured to the upper end of the upright shaft K. The reciprocating bar is prevented from turning with the scalloped wheel P by a guide standard *q*, in which the outer end of the reciprocating bar slides, while its inner extremity is maintained in its proper position by the upright shaft K, which passes through a slot in the bar; hence as the upright shaft and the scalloped wheel upon it revolve, a short and rapid, or tremulous, reciprocating movement is imparted to the reciprocating bar O, and from it by means of the arm *n* at its outer end to the cover G³ that is borne upon the bat by the weight of the rollers N.

In order that the hardened bat may be readily removed from the perforated cone, a blast of air is forced through the cone into the interior of the bat. This blast of air is obtained from the fan in the fan case beneath in the following manner. The interior of the draft box is divided by three radial partitions *s*, *s*, *s*, which extend inward to the central hub *k* into three divisions, one of which corresponds with each perforated cone. That portion of each radial partition which is above the circular opening in the collar plates *i* and below the central hub *k*, is cut away so as to leave the cylindrical space above the circular opening in the collar plates unobstructed. A curved partition *t* projects upward into this cylindrical space from the fan case beneath. This curved partition is secured by its lower edge to the collar plate upon the fan case, and it is of such height and breadth that it closes the space between two of the radial partitions *s*, *s*, and shuts off one division of the draft box and the perforated cone communicating therewith from the remaining two, so that the draft passing to the fan case cannot be drawn through the perforated cone whose base is adjacent to the curved partition. That portion of the top of the fan case, which is immediately beneath the division of the draft box from which the draft is shut off, is cut away, so as to form a communication between this division of the draft box and the smaller compartment of the fan case into which the fan discharges air; hence a portion of the air forced by the fan into the smaller compartment of the fan case, and tending to escape therefrom, finds its way upward into the cone, and passing through the perforations thereof presses upon the interior of the hat body, and assists its disengagement from the cone.

The various parts of the machinery thus described are caused to move by imparting a rotary motion to the main shaft E from the prime mover of the manufactory. When the machine is in operation the feed apron, feed rolls, picking cylinder, and perforated cones, move in the directions respectively indicated by the arrows in the drawings. A weighed quantity of fur or other suitable stock, sufficient to form one hat body, is laid by the attendant upon the feed apron, and is conveyed by it to the feed rollers which present it to the picking cylinder. The latter in its rapid revolution picks the fur and carries it around with it until it is deflected by the casing of the picking cylinder. When the fur leaves the cylinder it is drawn toward the perforated cone immediately opposite; as this cone slowly revolves the flocculent fur collects upon it until the charge upon the feed apron is exhausted; at this point of the operation the attendant stops the feed apron upon which he has meanwhile been distributing a second charge which is separated by a short vacant space from the first one. As soon as the whole of the fur is collected upon the perforated cone an attendant applies a cover to the bat and then turns the draft box one third around; this movement brings a second cone in the proper position to receive fur from the picker, while the first one, with the bat and cover upon it, is brought to the hardening apparatus, where the pressure applied by

the cover combined with the tremulous movement imparted to it induces a rapid felting of the fiber of fur and the consequent hardening of the bat. This operation proceeds so quickly that by the time the second cone has received a charge of fur upon it from the picking cylinder, the bat upon the first one is sufficiently hardened to bear handling without injury. The draft box is now turned a second third of a revolution by which movement the third cone is presented to the picking cylinder, the second one passes to the hardening apparatus, and the first with its hardened bat is freed from the hardening apparatus and is in the proper position for the removal of the bat. This operation is effected by shaking the cover by hand when the pressure of the air within the cone detaches the hardened bat so that it may be readily withdrawn with the cover, leaving the perforated cone free and ready to be again presented to the picking cylinder. After the hardened bat or hat body is removed from the machine, the hardening process may be carried to a greater extent by wrapping the bat in a damp linen cloth and working it by hand in the same manner that bats are worked in the manufacture of hat bodies by hand. The dimensions of the cover G^3 with respect to the bat are not important, provided that it be large enough to pass easily over it; as the object of the cover is not to confine the fur, but to impart pressure and motion to it. If the cover be of nearly the same size as the bat it should be perforated to permit the air to press upon the bat; but if the cover be five or six inches larger in diameter than the bat it is not necessary that it should be perforated as there will then be sufficient space for air to pass inside of the cover.

In the manufacture of hats it is customary to form the top of the cone of felt or hat body thinner than the rest, while those parts of the hat body which are to form the brim of the hat and to receive the hat band should be thicker than the rest. In order to accomplish this result the fur must be unequally distributed over the perforated cone, a larger quantity being delivered to those parts where the hat body is to be the thickest. I effect the requisite distribution of the fur for this purpose by varying the feed to the different portions of the picking cylinder.

From the foregoing description it will be perceived that the perforated cone is directly opposite the picking cylinder and is retained in its position while the fur is collecting; hence the fur which proceeds from any one portion of the picking cylinder lodges upon a corresponding opposite portion of the perforated cone; and if it be necessary to increase the thickness of the bat at any particular part of the perforated cone, the operation is effected by distributing the charge of fur upon the feed apron in such manner that there shall be more fur delivered to that part of the picking cylinder which delivers fur to the part of the perforated cone where the bat is to be made thickest, and on the other hand less fur is fed to that part of the picking cylinder which delivers fur to the part of the perforated cone where the bat is to be made thin, and which is usually the head or tip.

As the fur delivered by any part of the picking cylinder is always delivered to the same corresponding part of the perforated cone opposite the cylinder, it is easy in my machine to form different parts of the hat body of different qualities. Thus for example an excellent and cheap hat body can be formed partly of fur and partly of wool. In such a body those surfaces which appear to the eye, viz, the whole exterior and the interior of the brim, should be formed wholly of fur, while the interior surface of the crown and the mass of the hat body may be of wool. Such a hat body is readily formed by my machinery by feeding fur to that portion of the picking cylinder whence it is delivered to the part of the perforated cone that corresponds with the brim of the hat, while at the same time wool is fed to the other parts of the picking cylinder. As soon as enough fur has been fed to form the surface of the interior of the brim, wool alone is fed to the picking cylinder, and this is followed by a feed of fur alone, which, being collected upon the perforated cone after the wool, coats it over and forms a fur surface to the whole exterior of the bat.

It will be evident to the skilful mechanic that various changes may be made in the machinery described by me without materially affecting the principle of my invention, and I reserve to myself the right to make such changes as circumstances may require.

What I claim as my invention and desire to secure by Letters Patent, is—

1. The arrangement for hardening the hat body in a dry state by machinery operating substantially as herein set forth.

2. I also claim the method of facilitating the removal of the bat from the perforated cone by means of a blast of air forced through the cone.

In testimony whereof I have hereunto subscribed my name.

ALVA B. TAYLOR.

In presence of—
E. CHAPIN,
E. L. RENWICK.

[FIRST PRINTED 1912.]