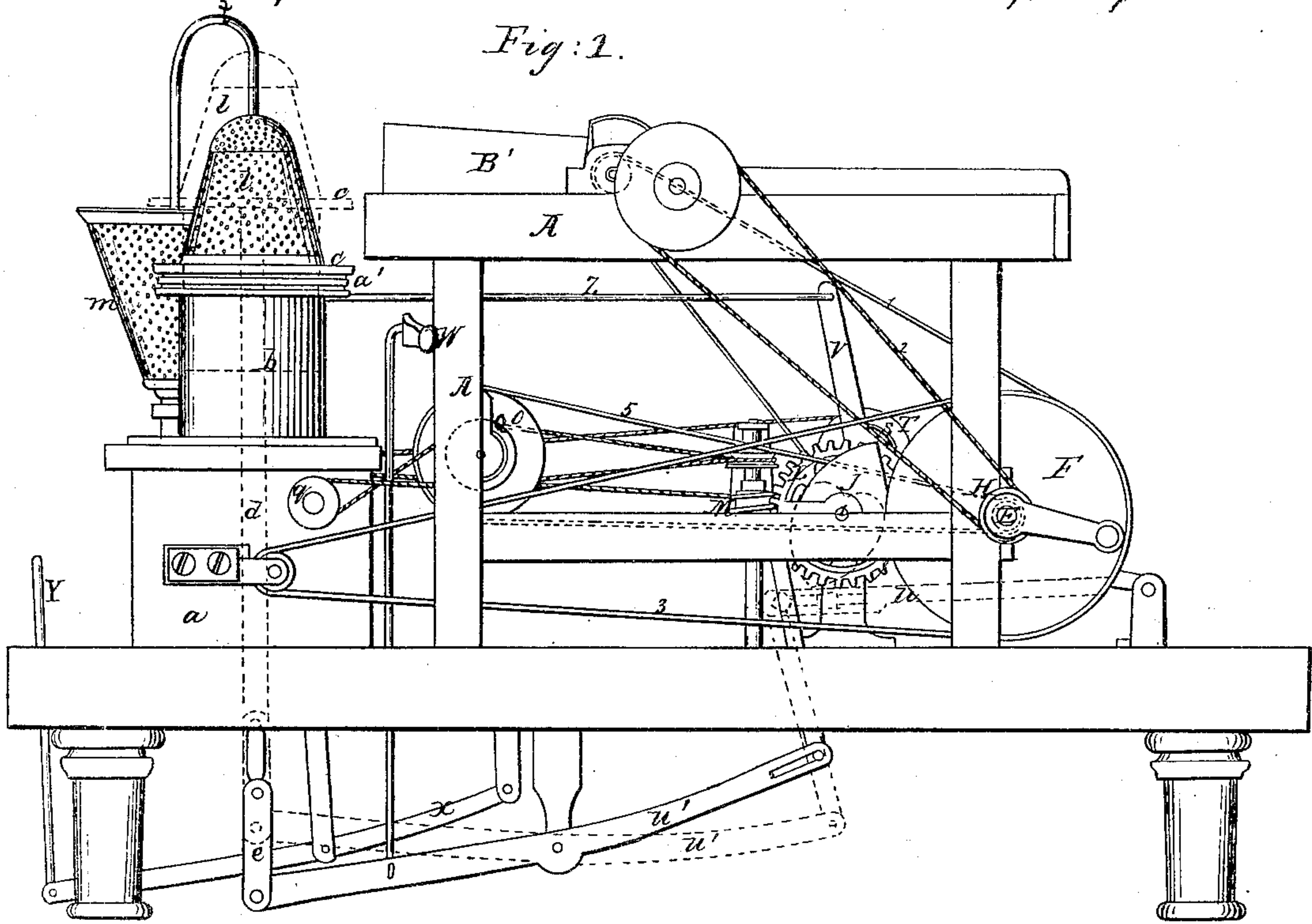


*A.C. Arnold Sheet 1, 2, Sheets*  
*Forming Bats.*

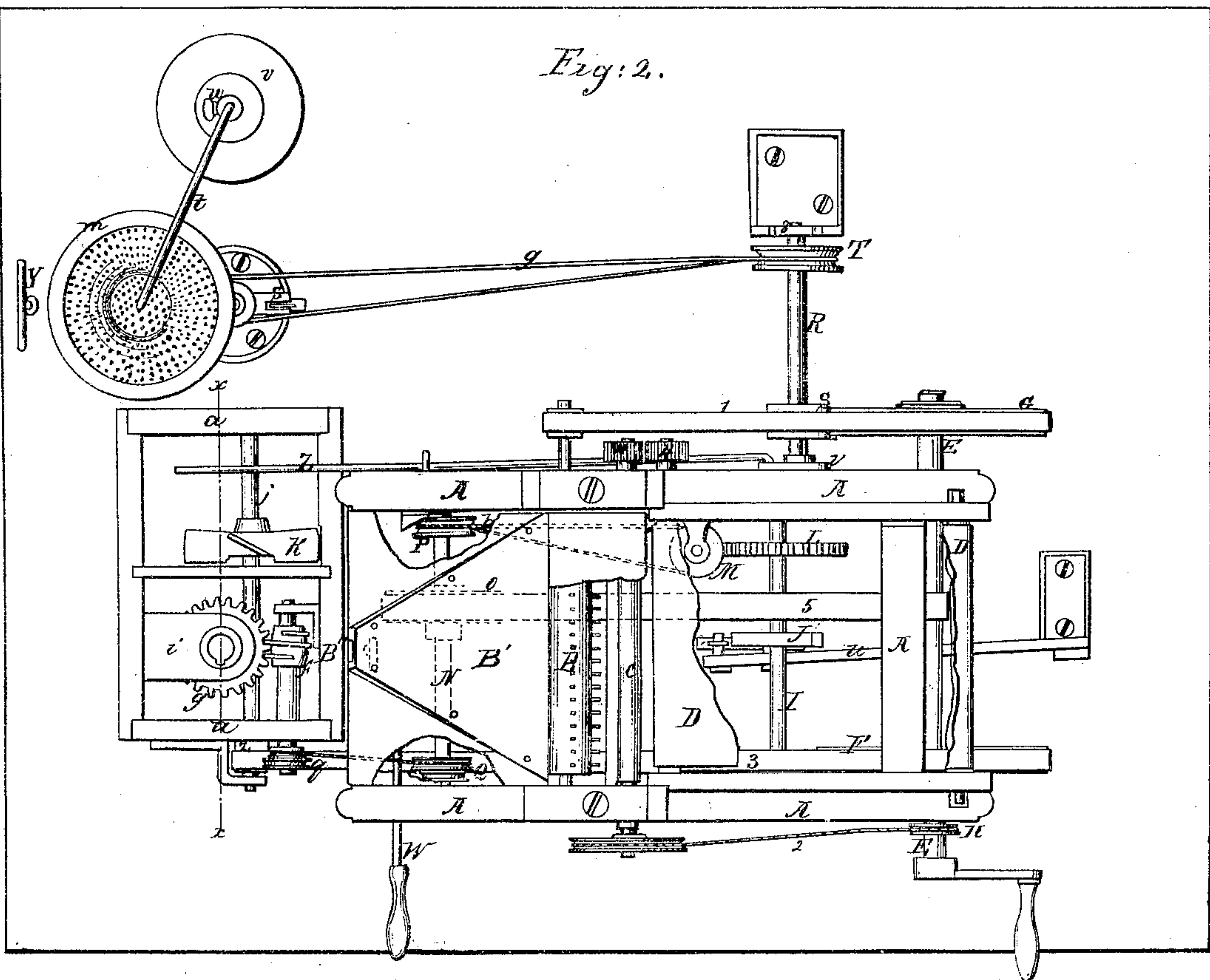
*No 18,316.*

*Patented Oct. 6, 1857.*

*Fig: 1.*



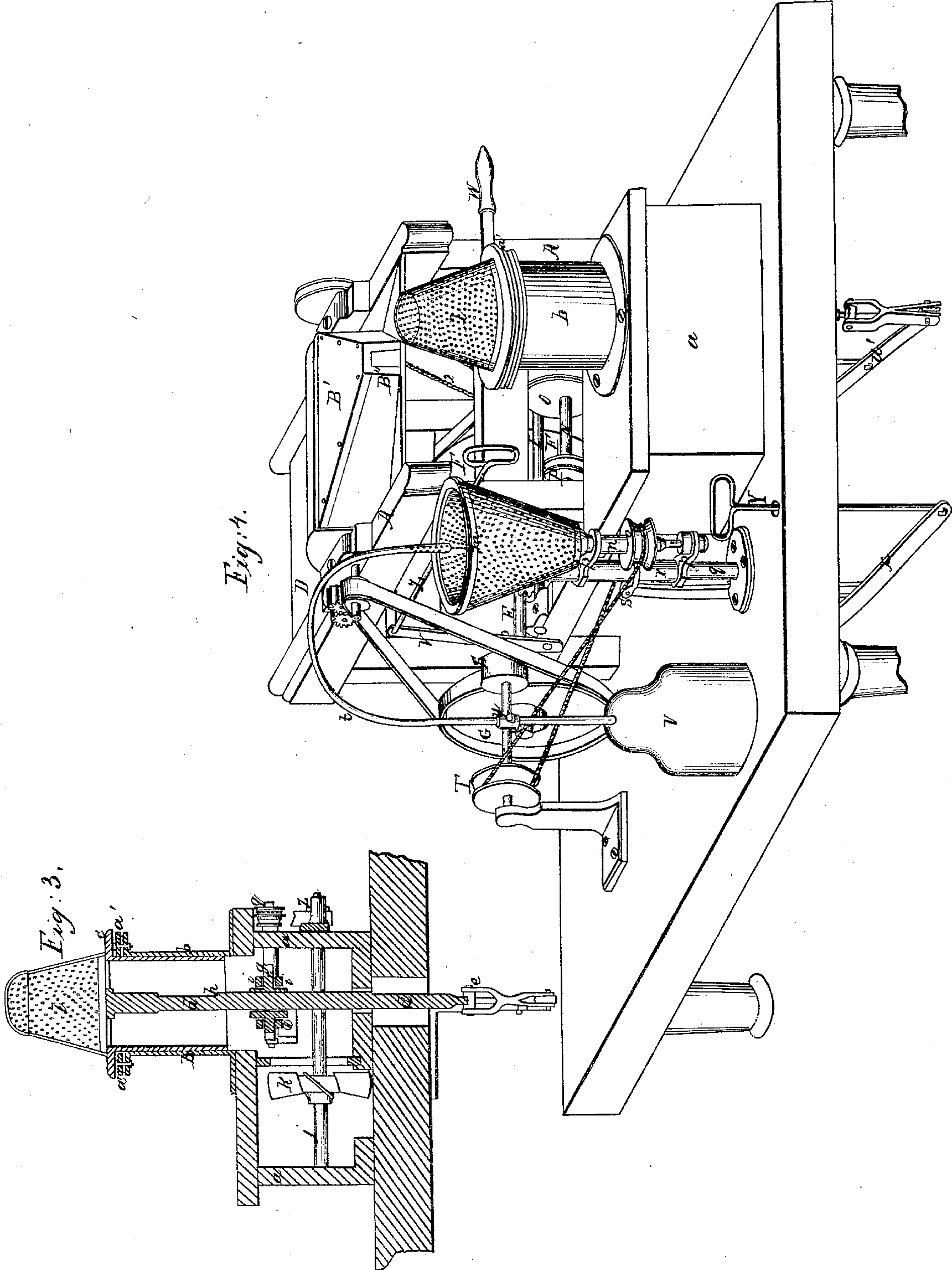
*Fig: 2.*



*A.C. Arnold. Sheets, 2 Sheets.  
Forming Bats.*

*No 18,316.*

*Patented Oct. 6, 1857.*





# UNITED STATES PATENT OFFICE.

ALONZO C. ARNOLD, OF NORWALK, CONNECTICUT.

## MACHINE FOR FORMING AND HARDENING HAT-BODIES.

Specification of Letters Patent No. 18,316, dated October 6, 1857.

*To all whom it may concern:*

Be it known that I, A. C. ARNOLD, of Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Machinery for Forming and Hardening 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 annexed drawings, making a part of this specification, in which—

Figure 1 is a side view of my improvement. Fig. 2 is a plan or top view of the same. Fig. 3 is a vertical section of the exhaust box, double cylinder, and cone, taken in the line (x) (x) of Fig. 2. Fig. 4 is a perspective view of my improvement.

Similar letters of reference indicate corresponding parts in the several figures.

This invention has two distinguishing features. The first relates to the formation of the bat or body of the hat, and the second to the method of hardening it.

The first consists in the adaptation of different portions of a perforated cone situated over an exhaust, successively, to an ordinary but concentrated blast of air created by a picker cylinder in which the fibers of fur are suspended so that although the fur is blown against a portion of the cone only, still it is by an adjustable, alternating, vertical, and positive motion of the cone, deposited over the entire surface and with precisely such variations as to quantity on given portions of the cone as may be required to make a perfect hat, or as the manufacturer may desire. This has not been, and cannot be, done with equal certainty by any device now known or in use; and it is effected by adding to the picking machine and exhaust box in common use a revolving, adjustable, heart-shaped cam and a lever, and sundry incidental and auxiliary parts, by means of which the cone receives a graduated, vertical, alternating motion, during the formation of the bat for the hat, accelerated or retarded by the form of the cam, or the application of a hand lever, so as to increase or diminish the quantity of fur deposited upon particular portions of the surface of the cone, as desired.

The second feature of my invention consists in the arrangement of the several devices employed in the operation of hardening the hat.

The above results are effected by applying the outer cone, as soon as sufficient fur is deposited on the inner one, locking the two together, and placing them in an inverted perforated cone or disk, and there subjecting them to a rapid revolving motion, and jets of steam from a pipe, having numerous apertures, extending into the disk.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The construction of the machine may be readily understand from a brief description of its several parts and their use, referring to the drawings and the letters of reference thereon.

A represents a rectangular frame, placed on a bed or platform A<sup>1</sup>, and supporting the picking and blowing devices.

B is the picker cylinder, which is driven by a belt (1) from the driving shaft E.

B<sup>1</sup> is the chamber within which the picker cylinder is placed; said chamber being of taper form and having a narrow eduction orifice B<sup>11</sup>, an opening for the admission of air being allowed underneath the picker cylinder.

C is a feed roller which is placed directly opposite a shell and rotated by a belt (2) from the shaft E.

D is a feed apron placed horizontally on the upper part of the frame A, and arranged in the usual way.

E, is the driving or power shaft on which several pulleys are placed, viz, the pulley F which, through the medium of a belt (3), drives a fan shaft (j); the pulley G which, by means of the belt (1) before referred to, drives the picker cylinder, and also a pulley H which, by means of belt (2) drives the feed roller C and also, by means of gearing (4) (4), the feed apron D.

I is a shaft having its bearings on the girts of the frame A; and J is a heart-shaped cam placed on said shaft, and L is a worm wheel also on shaft I.

N, is a shaft on which is placed a pulley O, around which a belt (5) passes from the driving shaft E. A pulley P is also placed on the shaft N; said pulley having a belt (6) passing around it, which drives a screw M, that gears into the worm wheel L, and communicates motion to the shaft I. A pulley Q is also placed on the shaft N, and a belt (7) around it; said belt commu-



nicating motion to a screw (*f*), which is placed within an exhaust box (*a*) hereinafter described.

R is a shaft one end of which is fitted in a permanent bearing (8), and the opposite end has its bearing in an adjustable lever V, the lower end of which is pivoted to the frame A. A pulley S is placed on shaft R, which pulley, when pressed against pulley G by means of lever V and a rod Z, rotates the shaft R. A pulley T is also placed on the shaft R; said pulley having a belt (9) passing around it, which belt rotates a disk (*m*).

U, U<sup>1</sup>, are levers by which vertical motion is communicated by the cam J, to the upright shaft (*d*) and the revolving disk (*c*) on which the cone (*l*) is placed.

W is a hand lever connected with the lever U<sup>1</sup>, to enable the attendant to hold the cone in any desired position.

X is another hand lever, moved by the lifting rod Y, to elevate the disk (*m*) under the steam pipe, (*t*) when it is desired to let the jets of steam into the revolving cones.

The exhaust box (*a*) is divided through the center by a partition in which there is an opening for the passage of the air. In one part of this box, the screw (*f*), previously referred to, is placed, and a worm wheel (*g*) into which the screw (*f*) gears; the wheel (*g*) being supported by the brackets (*i*). The shaft (*d*) passes through the center of the wheel (*g*) said shaft being connected with said wheel by means of a feather and groove, so that a vertical movement is allowed the shaft which at the same time may be rotated by the wheel. The shaft (*j*) has a fan (*k*) placed on it, by which the exhaust is produced.

*b*, is a cylinder placed upon the box (*a*); the upper portion sliding easily within the lower one, and having a disk (*c*) attached, upon which the cone (*l*) is placed and rotated. To the upper end of each cylinder a flanch (10) is attached, between which a collar (*a*<sup>1</sup>) is fitted for the purpose of holding a packing of india-rubber or other suitable material to prevent the ingress of air between the two cylinders. The upright shaft (*d*) rests upon an adjustable step (*e*) and is connected at its upper end with the arms of the disk (*c*), and serves to rotate as well as elevate the cone which is placed upon the disk.

(*m*) is an inverted conical perforated cone, resting upon the end of an upright shaft (*n*) which is supported by brackets (*p*, *p*<sup>1</sup>) attached to a sleeve (*r*) sliding on a stationary upright shaft (*g*). The shaft (*n*) rotates readily in the brackets (*p*, *p*<sup>1</sup>), and has a pulley upon it, which is connected by a band with a pulley T, on the shaft R. The sleeve (*r*) and its attached brackets and cone are elevated by the lever X, and its con-

nections, at pleasure, so as to bring the revolving cones under the steam pipe (*t*). This steam pipe is connected with a small boiler (*v*) and has a valve (*u*) and numerous small perforations through that part of it around which the revolving cones are elevated to permit the escape of the steam within the cones when the valve (*u*) is opened.

The operation is as follows: The fur is spread upon the feed apron and fed to the feed roller, and by that to the picker cylinder. By this picker cylinder, it is separated and suspended in the blast which the picker cylinder creates in connection with the air which enters the chamber through the opening beneath the cylinder. The blast thus created, with the fur suspended in it, passes out at the opening B<sup>11</sup>, and carries the fibers of fur on to the revolving cone where they are held firmly by the exhaust. At every revolution of the cone, it is alternately ascending or descending, so that a new portion of the cone is presented to the blast. But as the perfection of the hat, as well as the increased size of the cone, requires that the blast should be directed for a longer period upon the base of the cone, the cam is so shaped and adjusted that the vertical motion is retarded when that end of the cone is presented to the blast, and accelerated when the upper and smaller end is so presented, and also when a less quantity of fur is required. When a large cone is required to be used and a large hat made, the connecting rod between the levers U, U<sup>1</sup>, is adjusted at the extreme ends of those levers and the greatest throw is obtained. And when a smaller cone is used, and less elevation is required, the connecting rod is adjusted in the slots, at a greater or less distance from the end of those levers, and the desired elevation obtained. If an increased quantity of fur is desired in any portion of the hat, the cone may be held, vertically exposed to the blast, in the desired position, by the hand lever W, during one or more half revolutions of the cam. After the desired quantity of fur is deposited upon the cone, the outer cone is placed upon it, the two are placed together in the inverted cone (*m*) which is elevated by the lever X, until it surrounds the steam pipe; the steam valve is then opened, the pulley on the shaft R pressed against the pulley G on the main shaft, and a rapid revolving motion thus given to the cones. And thereupon the fur leaves the inner cone; and the motion of the fibers, aided by the steam and the centrifugal force, felts and hardens the hat, which, in a very short time, is ready to be removed. The pulley S is then withdrawn from its connection with the pulley G, the steam is shut off, and the inverted cone (*m*) is lowered. The two interior cones are then suc-



cessively taken out of the cone (*m*), and the largest or furred cone is inverted upon a table, and the "body," in a hardened and perfect condition, falls readily from it.

5 From this description of the construction and operation of my invention, it will be seen to be readily distinguishable from all others.

10 The use of the picking machine with its feeding appendages, chamber, and blast, and the revolving cone and exhaust, the several motions by which they are operated, and the method of forming a hat thereby, have long been known to the public. But difficulties  
15 attended the process, growing out of the necessity of having a blast of sufficient volume to surround the presented section of the cone, and of suspending the fur equally throughout the large volume of blast, in  
20 order to make a hat of uniform thickness. Various devices have been resorted to, in order to overcome this difficulty and also to direct the blast equally upon the cone. Thus, Henry A. Wells, in 1846, claimed to  
25 have devised, and patented, the use of a brush cylinder, to create an increased blast and suspend the fur more effectually in it, and a method of directing the blast to and around the cone by a continued, adjustable  
30 chamber, adapted to the inclination of the cone, and having a hood to direct the fur upon the top of the cone. And Daniel Barnum, in 1851, claimed to have devised, and patented, a new and useful method of in-  
35 creasing the blast and suspending the fur in it, by the introduction of a fan into the chamber of the picking machine, and also a method of directing the increased blast upon the cone, in tangents, by a peculiar  
40 adjustment of the opening from the chamber. These devices have been but partially successful, and "bodies" are not now perfectly or rapidly formed by them.

45 My invention is of a totally different character. It contemplates no increase of the ordinary blast, nor any device for directing it in a more perfect manner, nor at all, upon the presented section of the cone. But it dispenses with all such devices, and  
50 all necessity for them, and adapts portions of the cone, successively, to the ordinary blast of a picker cylinder, by positive, controllable movements; thereby exposing the whole surface of the cone to the blast during  
55 the formation of the hat, but in horizontal sections, successively and alternately, with such variations in the length of time, during which particular portions are presented to the blast, as may be necessary to vary the  
60 thickness of the hat, when such variations are desired, or to make it of perfectly uniform thickness when required.

65 The distinction between that part of my invention which relates to the hardening of the hat, and all other known devices, is very

obvious. While Wells hardens by the application of a wet cloth and a metallic cover, and immersion in hot water; and Barnum effects the same object by jets of hot water, driven through the hat while forming, by  
70 the force of his blast; I effect it, more perfectly, by the application of the centrifugal force attending rapid revolution, a transference of the hat from one surface to another, and the consequent felting of it, aided  
75 by the well known felting assistance of jets of steam.

It is equally obvious that the principle of my invention, in respect to the formation of the hat, may be varied in its application by  
80 attaching the lever  $U^1$ , to the end of the chamber at  $B''$ , giving an alternately vertical motion to that, or to a spout attached to it, and thus directing the blast upon the different portions of the cone, successively,  
85 without any vertical motion of the cone; or that the two applications may be combined, by the addition of another set of levers of similar construction and arrangement, and another cam upon the cam-shaft, operating  
90 reversely, thus elevating and depressing the cone and the chamber simultaneously, but in opposite alternating directions. Inasmuch, however, as all movements of the chamber, or of an attached spout, tend to  
95 interfere with a perfect and uniform suspension of the fibers of the fur in the blast, the simple device represented in the model and drawings will be found, in practice, the most eligible application of the principle of  
100 the invention. The "body" may also be formed, and I have contemplated its formation, by inverting the cone upon the disk, permitting it to descend within the cylinder over the exhaust, directing the blast into it  
105 from the chamber by a spout, and giving it a controllable rapid revolution, and thus forming the "body" on the inside of the cone, by the combined agency of the exhaust and of centrifugal force; applying, simul-  
110 taneously, or subsequent to the formation of "body," and during the continuance of the revolution, jets of steam to assist in hardening it. By this device the "body" can be  
115 formed and hardened by a single operation, and with a great saving of labor. But as a representation of the device will require a separate model and drawings, and by the rules of the office, it requires a separate ap-  
120 plication, as a distinct invention, I propose to ask for a separate patent for it, as soon as the model and specifications can be prepared.

An extended notice of the advantages of this invention is unnecessary. The difficul-  
125 ties attending the creation of a blast of sufficient volume to the presented surface of the entire cone and of suspending the fur in it so that equal spaces shall contain equal  
130 quantities of fur, or so that particular spaces



shall contain uniformly greater quantities and thus make the hat of uniform thickness or of greater thickness where required, have not been and cannot be overcome by the devices in use. The force of the blast must be limited, so as not to overcome the suction of the exhaust; and not only will the fur not be equally distributed in it, but the heavier and coarser fibers will settle and separate and thus a great irregularity in the thickness of the hat, and the quality of the fur in different portions of it, must necessarily exist. These difficulties cannot attend my invention; and by it, the fur can be placed uniformly over the entire cone, or in greater quantities and with positive certainty on any portion of it.

I do not claim the picking machine and feeding appendages, or chamber, nor the exhaust box, nor fan, nor any of the movements for driving either, or revolving the

cone; nor the method of forming a hat by their use, but

What I claim as new, and desire to secure by Letters Patent, is— 25

1. The cam-shaft I, worm wheel L, cam J, levers U, U<sup>1</sup>, step (e), cylinders (b), and collar (a), or their mechanical equivalents, arranged and operated substantially as described, and for the purposes set forth. 30

2. I further claim the shaft R, lever V, pulleys S and T, the inverted cone or disk (m), the brackets (p) (p), shaft (n), pulley (o) sleeve (r) shaft (q) lever X, and lifting rod Y, or their mechanical equivalents, arranged and operated substantially as described, and for the purposes specified. 35

ALONZO C. ARNOLD.

Witnesses:

SAML. R. P. CAMP,

GEORGE A. DAVENPORT.