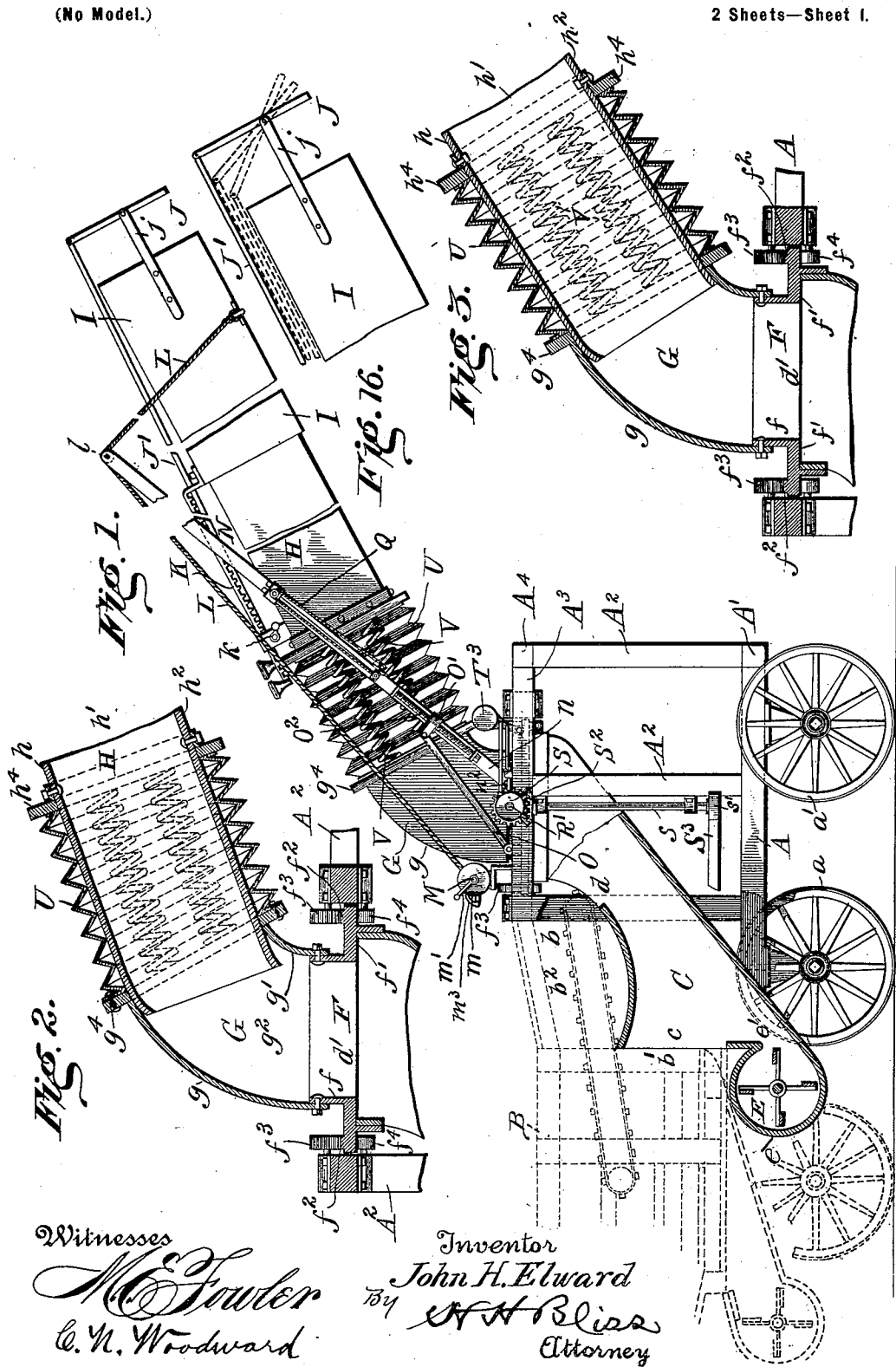


J. H. ELWARD.
PNEUMATIC STACKER.
(Application filed Dec. 9, 1901.)

(No Model.)

2 Sheets—Sheet I.

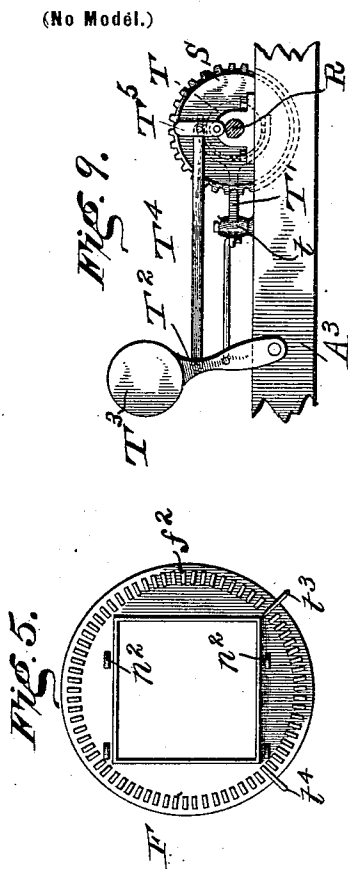
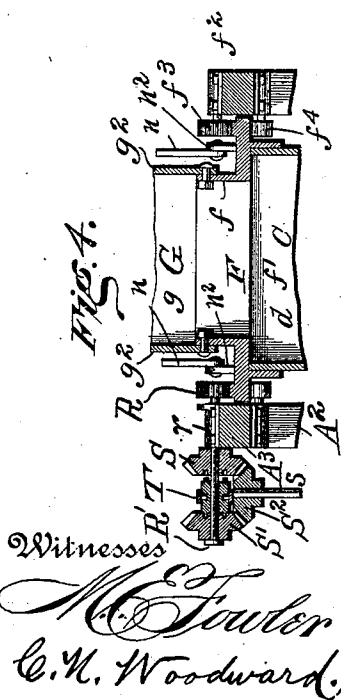
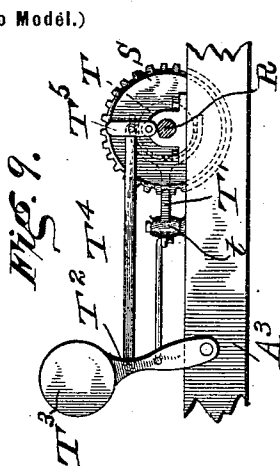
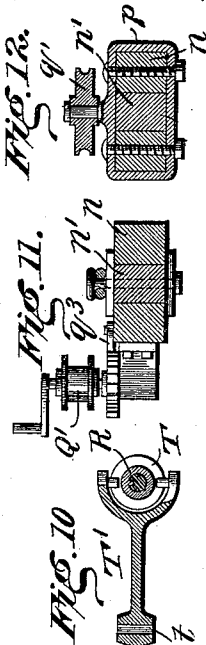
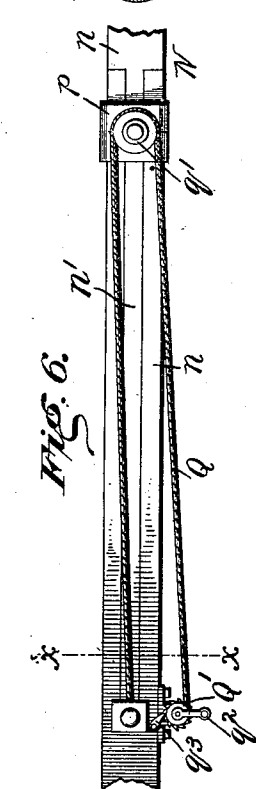
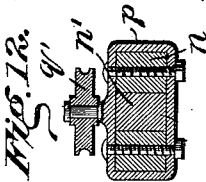
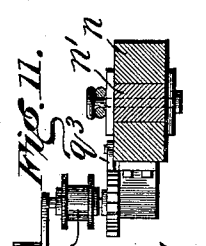
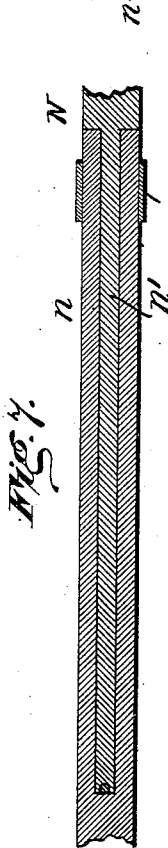
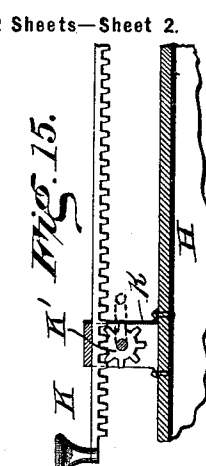
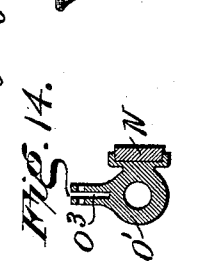
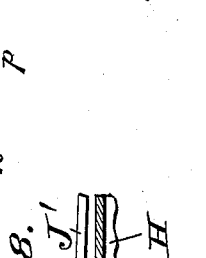
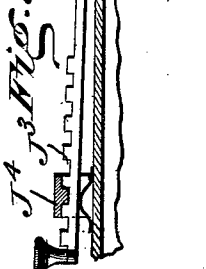
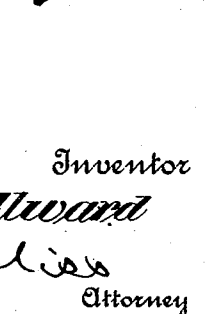


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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF PRETTY PRAIRIE, KANSAS, ASSIGNOR TO THE INDIANA MANUFACTURING COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION OF WEST VIRGINIA.

PNEUMATIC STACKER.

SPECIFICATION forming part of Letters Patent No. 706,037, dated August 5, 1902.

Original application filed January 5, 1893, Serial No. 457,328. Divided and this application filed December 9, 1901. Serial No. 85,253. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ELWARD, a citizen of the United States, residing at Pretty Prairie, in the county of Reno and State of Kansas, have invented certain new and useful Improvements in Pneumatic Stackers, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation of a stacking mechanism embodying my improvements. Fig. 2 is a longitudinal vertical sectional view through a portion of the apparatus. Fig. 3 is a similar view showing the delivery-duct inclined at a different angle to its hood or supply section. Fig. 4 is a vertical transverse sectional view. Figs. 5 to 16 are detail views.

In the drawings I have shown a portion of a threshing-machine sufficient to illustrate the manner of employing my mechanism in connection therewith, the elevator or stacker herein provided being adapted for use with any of several styles of threshing-machines.

In order to provide a strong and durable machine, I provide for the elevator or stacker a supporting-frame and transporting-wheels, which are separate from and independent of the frame and the wheels which carry the parts of the thresher proper. $A A'$ indicate the sills and cross-girths of such a frame, it being mounted upon front and rear wheels $a a'$. Uprights A^2 of suitable number are secured to the bottom frame $A A'$, and at the top they carry a horizontal framework having the longitudinal parts A^3 and the cross-bars A^4 . The frame and wheels constitute a vehicle separate from the thresher and which vehicle can be hitched to the engine sometimes employed for transporting, or horses can be employed, as desired.

The elevator or stacker comprises as its essential elements an initial receptacle, an air-blast mechanism, and the tubular delivery chute or duct.

The thresher at B has an exit at b for the straw and one at b' for the chaff and fine foreign materials which are blown out from the

winnowing-shoe. To receive the said chaff and the fine material from the thresher-fan, I employ a spout, chute, or duct at C, which is preferably of larger cross dimensions at the mouth c than it is at points remote therefrom, so as to be adapted to register with the entire opening in the thresher at the rear of the winnowing-shoe and also to permit the straw-carrier or beater-apron at b^2 to discharge the straw properly into the initial receptacle of the stacking mechanism. At d there is an opening or mouth, which can be brought close to the end of the said carrier b^2 . Thus both the straw and the chaff or fine stuff can be thoroughly collected from the thresher, passages for each of them being provided in which they travel on substantially the lines along which they normally escape from the thresher.

At the bottom and the front end of the stacker-vehicle I place the fan E and the fan-casing e , there being a throat at e' , through which the jets of wind pass upward through the chute C, this throat being below the line at which the chaff escapes from the thresher-shoe. The currents of air are of such strength as to propel the chaff upward, and when they reach the straw which has been introduced through the orifice at d they also force it, together with the chaff, to a considerable distance. To direct the material which is carried upward and backward by the wind to the places where it is desired to deposit it, I combine with the parts above described an adjustable mechanism for guiding the straw and the air-currents, as follows:

The initial receptacle C terminates in a circular portion at d' . Around the edge of this part there is mounted a ring F, it being formed with the vertical part f and a horizontal flange f' , the horizontal part f' having a series of gear-teeth f^2 thereon. The horizontal flange f' is placed between antifriction-rolls $f^3 f^4$, some below it and some above. To the ring F, above described, there is secured a hood G, preferably formed of sheet-iron, having the rounded front part g and the backwardly-extending walls $g' g^2$. In this hood is inserted the lower end of the second section H of the

tubular chute or spout. It is formed with a top wall h , side walls h' , and the bottom h^2 . At its inner or lower end it is fitted in the hood-section G and preferably so connected and arranged in relation to the hood that it is capable of a limited inward and outward movement, if necessary, to allow for a species of flexibility.

U represents a flexible canvas or leather joining device, the ends of which are fastened to the hood and to the spout-section H. By the employment of such a flexible coupling device I avoid the necessity of constructing the metallic parts in the manner commonly followed, so as to provide an air-tight joint between the metallic surfaces. It will be seen that the lower or inner end of the section H can be left sufficiently loose in the hood to permit the desired movement of its delivery end, and at the same time the flexible cover U insures that the air shall escape through the chute, and as there is no possibility for the air to escape around the inner edges of the chute the straw will not be forced around said inner edges, but through the center of said tube or chute. As shown in the drawings and hereinbefore stated, the spout or duct section H is therefore connected to the hood G by a flexible joint and in such manner as to be adjustable in relation thereto to vary the inclination of the delivery-duct, and means are provided for limiting the outward movement of said section H relative to the hood G.

The flexible connection U is preferably made in the form shown—that is, it consists simply of a piece of suitable material arranged in a series of accordion-like folds and having its ends securely fastened to the flanges g^4 h^4 on the hood G and duct-section H, respectively. By this construction said flexible connection is adapted to be contracted or expanded and permits free longitudinal movement of the duct-section H relative to the hood G when the angle of inclination of said duct-section is varied—that is, the inner end of the section H and the flange h^4 thereon are constantly changing their positions relative to the outer end of the hood during adjustment of said duct-section, and by having such a flexible connection as that herein illustrated and described between these parts I provide for maintaining an air-tight joint between said parts, the cover U expanding longitudinally or contracting, according as the flange h^4 approaches or moves from the end of the hood G. Thus when the said chute is adjusted to the position indicated in Fig. 3 the portion of the flexible connection adjacent to the under side of the delivery-duct is expanded or extended to its fullest extent and the portion adjacent to the top surface of said duct is contracted, while when the parts are in the relative positions illustrated in Fig. 1 the said flexible connection is of substantially the same length at all points around the duct. The flexible cover U acts

as a stop; but in the construction shown I have illustrated a supplemental stop consisting of a series of coiled springs V. These springs are arranged outside of the cover U and have their ends attached to the flange g^4 at the rear end of the hood-section and the flange h^4 on the duct-section H, to which the cover or flexible connecting device U is also attached. The section H can, by reason of its flexible connection with the hood G, be readily adjusted vertically to any of the several positions ordinarily required.

I indicates a supplemental spout-section fitted to the outer end of the section H and adapted to be moved out or in in relation thereto. Preferably the two sections H I are telescopically connected, so that the part I can be drawn down over the part H to make the whole apparatus compact when it is being transported. The mechanism shown for effecting this longitudinal movement of the section I comprises a rack-bar K, secured to it, and the pinion K', mounted in bearings at any suitable point, as at h , on the part H or on the hood. The end of the outer section or part I is provided with an adjustable guide or deflector J, adapted to deflect the straw in any line or path desired. To adjust this, use is made of a bar J', extending back to points where it will be accessible and having combined with it suitable means for locking it in any desired position, such as a rack or toothed part at J³, with a stop or lug at J⁴ engaging with the teeth on the part J³. The deflector is preferably situated at a distance from the end of the spout I and is carried by bearers j , to which it is pivoted.

To raise and lower the sections H and I, use is made of ropes or cords L. They are secured at their outer ends to the spout-section I and then extend up over sheaves l and down to drums or spools m on a winding-shaft M, which is situated at a suitable point, preferably being mounted on the support for the hood G, and is provided with cranks at m' for winding it and pawls m^3 for locking it. The sheaves or pulleys l are mounted in the upper ends of braces N. These are formed of two or more sections n n' , so connected as to provide for extension, and each brace as a whole is pivoted at n^2 to the aforesaid ring. To hold each brace N at the desired angle of inclination to the plane of rotation, I use bars O, which are pivotally connected to the ring F and are connected to the brace N by means of a nut O' and a screw-rod O², mounted in bearings at o' o^2 on the part n , the nut O' having an extension o^3 , to which the supporting-link O is pivoted. The screw O² can be rotated, as by applying a wrench at o^4 , and the nut can be thereby moved up or down, as desired. The extension longitudinally of the braces N can be accomplished by the devices shown, as follows: The parts n n' overlap, the part n being preferably slotted and the part n' being tongued to fit the slot. Metallic loops p can be placed around the overlapping parts

to hold them firmly with relation to each other and yet allow longitudinal movement. As shown, the part *n* is moved upward by a rope *Q*, which has its lower end fastened to the lower end of the tongue *n'* and passes thence upward to the sheave *q'* on the loop *p* and thence down to a winding-wheel *Q'*, mounted on the part *n* and having a crank *q''* and a locking-ratchet *q'''*.

As it is desirable to deposit the straw not only at points in the vertical central longitudinal plane of the machine, but also at points in planes at the sides thereof in order to distribute the stack over the ground area as large as possible, and is also desirable to constantly change the point of deposit, I combine with the mechanism above described means for automatically oscillating the stacker spout or chute.

R is a pinion meshing with the above-described teeth *f''* on ring *F*, it being carried by shaft *R'*, mounted in a bearing at *r*, secured to the top frame-bar *A''*. This shaft has also two beveled wheels *S S'*, each adapted to engage with a bevel-pinion *S''*, mounted on a vertical shaft *s*, said shaft having a belt-wheel *s'*, driven by a belt *S''*, extending to any suitable pulley on the thrasher. The wheels *S S'* are loose from the shaft *R'* and are continuously rotated in opposite directions. *T* is a clutch feathered to the shaft and adapted to engage said wheels alternately with the shaft. Said clutch is automatically shifted as follows:

T' is a bell-lever pivoted at *t*. *T''* is a vibrating lever having a weight *T'''* to carry it past its center and temporarily hold it. This lever is preferably pivoted so as to vibrate in a plane to be tangent to the circle of rotation of the ring *F*. Said ring or some part rotating therewith is provided with trip-pins *t'' t'''*, and lever *T''* or part connected therewith, as a lever *T'''*, lies in the path of their rotation. As shown, the levers *T''* and *T'''* are connected by a link *T''''*. When the pin *t''* reaches lever *T'''*, it throws it and also lever *T''* over, so as to reverse the clutch, and thereupon the shaft *R'* is reversed and also the ring *F*. This movement of the latter continues until the pin *t'''* reaches lever *T'''*, whereupon the latter is thrown back, and shaft *R'* and ring *F* are again reversed. In this way the stacker-chute can be automatically oscillated, so that the straw can be delivered from its outer end over a large area; but I do not wish the other features of the invention to be limited to this or any particular mechanism for effecting such lateral movement of the spout.

The manner of using the machine above described will be readily understood. After the thrasher *B* has been properly placed the stacker-vehicle is brought into the proper position and so adjusted that the openings behind the thrasher-shoe shall register with the entrance to the chaff-receiver and so that the straw-exit at *b* shall register with the

entrance-orifice for the straw at *d* in the stacker. The belt *S''* is connected, (if the lateral movement of the spout is to be caused by power,) the spout-section *I* is extended to the desired point, the proper angle of inclination for braces *N* is provided by suitably adjusting the nuts at *O'*, the chute-sections *H* and *I* are by means of the ropes *L* placed at the proper inclination, and the fan *E* is connected by a belt to the pulley which drives it. After the thrasher and separator have been set in motion and the straw and chaff begin to be delivered they are immediately caught up by the blast of wind from the fan *E* and carried through the parts *G*, *H*, and *I* and thrown to the desired point. As the stack becomes higher the positions of the parts *H*, *I*, and *J* are varied by the adjusting devices at *M*, *O'*, and *Q*.

I do not in this application claim the peculiar construction of the sections *H* and *I* and their relation to each other and to the hood-section *G* or the means for adjusting such sections, nor do I herein claim the construction and arrangement of parts by which the direction of the material delivered by the stacker duct or spout is controlled, such matters being claimed in my earlier application, Serial No. 457,328, filed January 5, 1893, of which the present application is a division.

What I claim is—

1. In a pneumatic stacker, the combination with a horizontally-rotary hood, and a vertically-adjustable delivery tube or chute, of the longitudinally-extensible flexible joint secured to the hood to move horizontally therewith and also secured to the chute or spout to move vertically therewith, substantially as set forth.

2. The combination, in a pneumatic stacker, of a horizontally-rotary hood, an air chute or spout having its inner end telescopically connected with said hood, and its outer end vertically adjustable, and the longitudinally-extensible, air-tight, flexible cover surrounding the adjacent ends of and rigidly secured to both said hood and chute, substantially as set forth.

3. In a pneumatic stacker, the combination of a hood, a delivery-duct having a vertically-adjustable outer end and having its inner end movably connected to the hood, a support for the outer end of the delivery-duct connected with the main frame, a rotary base for the aforesaid parts, and a flexible, extensible cover connected to the hood and to the delivery-duct, substantially as set forth.

4. In a pneumatic stacker, the combination of a hood, a delivery-duct, an adjustable support for the outer end of said delivery-duct, means for adjusting said support to vary the elevation of the discharge end of said chute, a flexible joint connecting the said delivery-duct and the hood and extensible longitudinally of the said delivery-duct, and a horizontally-rotary base for all of the said parts, substantially as set forth.

5. The combination, in a pneumatic stacker, of the lower or inner chute or hood, the chute or trunk movably connected with said hood, and the springs arranged to bear upward and
5 outward against the outer chute, substantially as set forth.

6. In a pneumatic stacker, the combination with the lower section or hood, and the chute or spout communicating therewith, of a flexible cover surrounding the adjacent sections
10

of the hood and chute, and springs connecting the hood and chute, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:

JOHN P. O. GRABER,

H. B. HAMLIN.