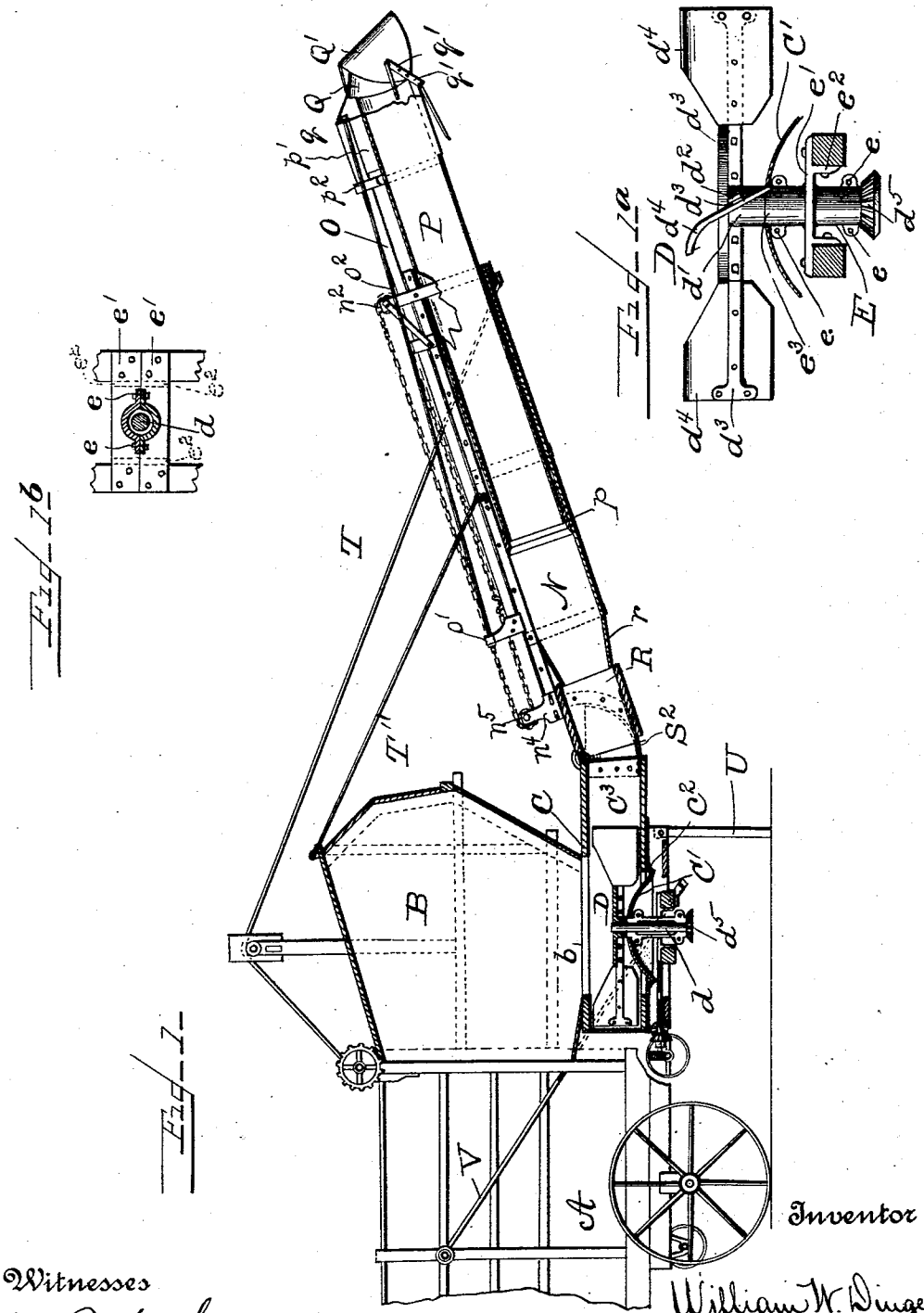
(No Model.) 3 Sheets—Sheet 1.

W. W. DINGEE.

PNEUMATIC STACKER.

No. 571,898. Patented Nov. 24, 1896.



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(No Model.) 3 Sheets—Sheet 2.

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PNEUMATIC STACKER.

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Fig. 2.

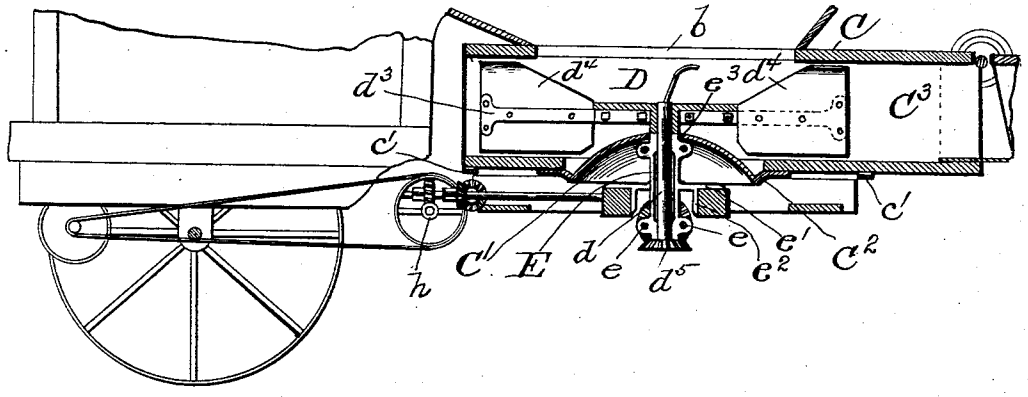


Fig. 3.

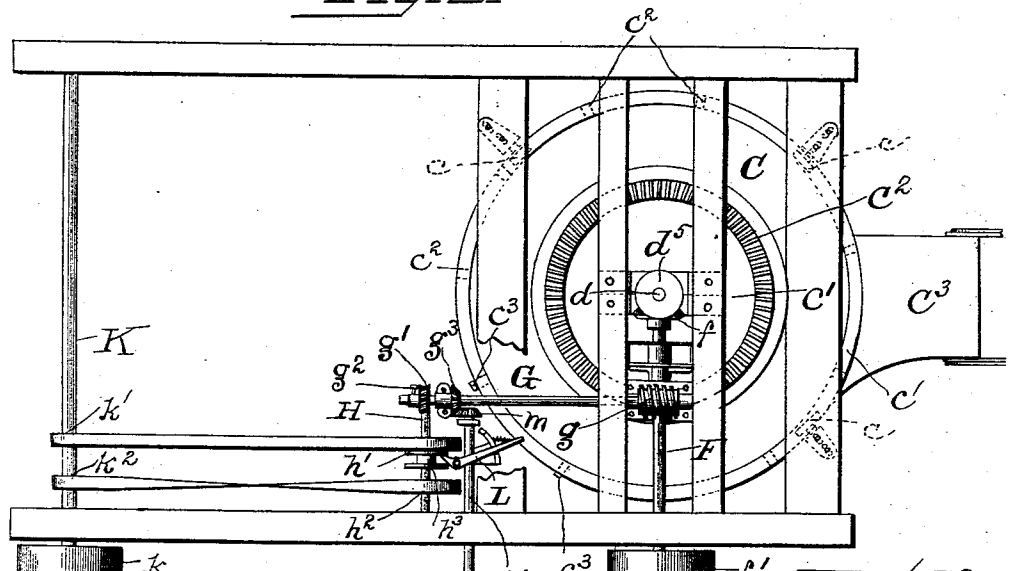


Fig. 3a.

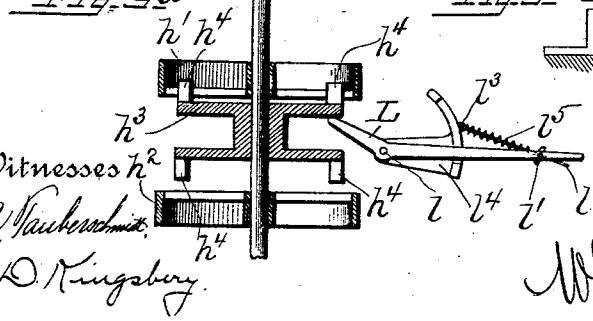


Fig. 3b.

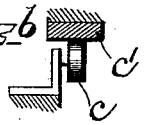
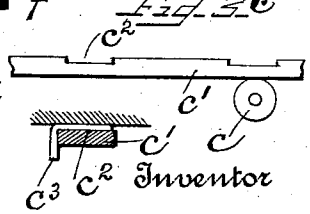


Fig. 3c.



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(No Model.) 3 Sheets—Sheet 3.

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PNEUMATIC STACKER.

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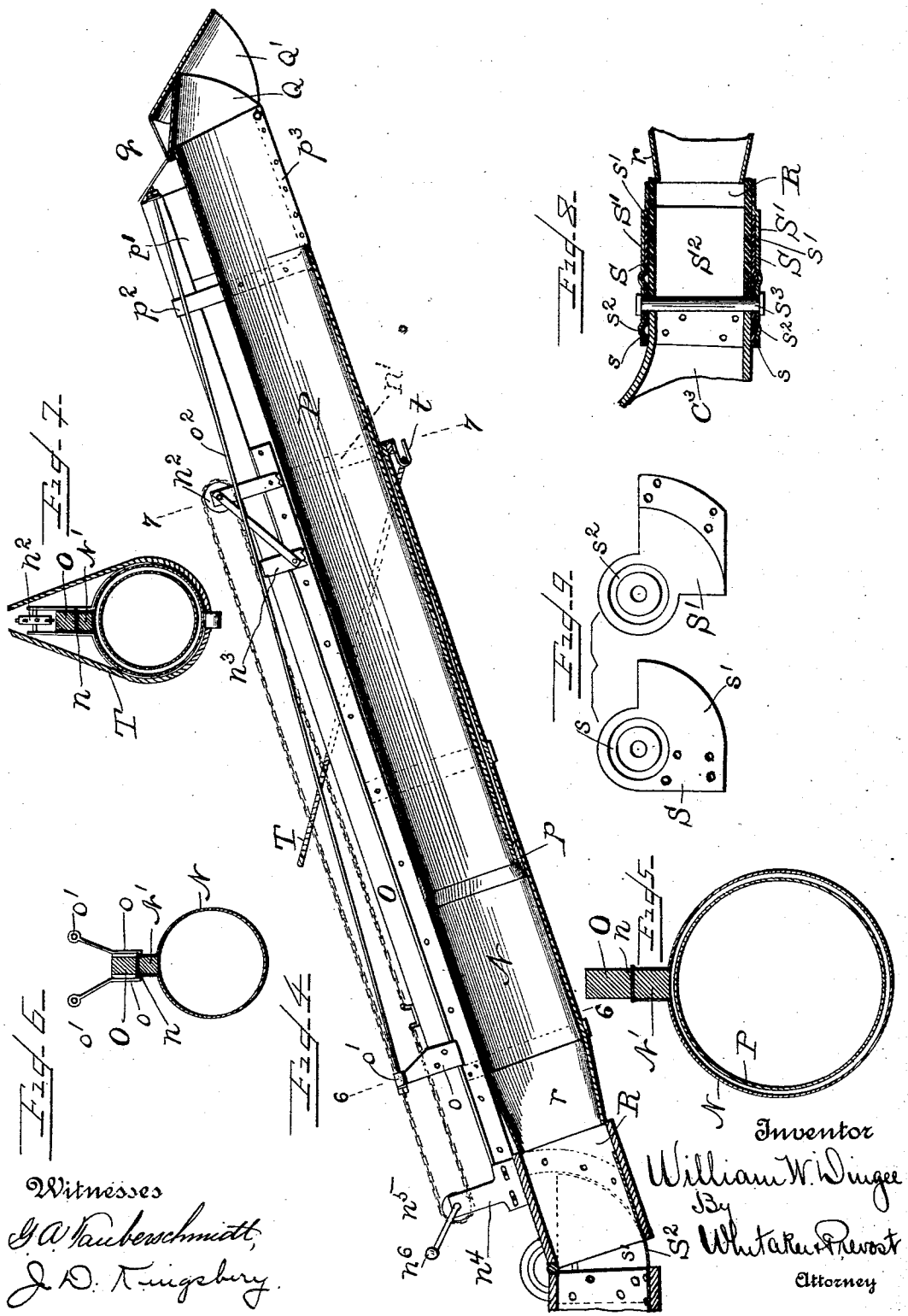

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UNITED STATES PATENT OFFICE.

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PNEUMATIC STACKER.

SPECIFICATION forming part of Letters Patent No. 571,898, dated November 24, 1896.

Application filed June 18, 1895. Serial No. 553,221. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DINGEE, a citizen of the United States, residing at Racine, in the county of Racine and State of Wisconsin, have invented certain new and useful Improvements in Pneumatic Stackers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features of construction and combination of parts hereinafter fully described, reference being had to the accompanying drawings, which illustrate one form in which I have contemplated embodying my invention, and said invention is fully disclosed in the following description and claims.

Referring to the said drawings, Figure 1 represents a central longitudinal vertical section of the rear portion of a grain-separating machine, showing my improved pneumatic stacker embodied therein. Fig. 1^a is a detail view of the fan and its supports. Fig. 1^b is a detail sectional view of the fan-shaft bearing. Fig. 2 is an enlarged sectional view showing the fan-casing and fan. Fig. 3 is a bottom view of the fan-casing, showing the means for driving the fan and for reciprocating the fan-casing and the stacker-tube. Figs. 3^a, 3^b, and 3^c are detail views of parts shown in Fig. 3. Fig. 4 is an enlarged sectional view of the telescoping stacker-tube. Fig. 5 represents a section through the telescoping tubes, enlarged to a greater degree than Fig. 4. Fig. 6 is a sectional view of the tube, taken on line 6 6 of Fig. 4. Fig. 7 is a similar view taken on line 7 7, Fig. 4. Fig. 8 is a horizontal sectional view of the hinge connection between the fan-casing and tube. Fig. 9 shows in detail the two parts of the hinge for one side of the joint.

In the drawings, A represents the frame of the grain-separating machine, provided at the rear with the chamber B, into which the threshed straw is delivered by the separating devices, which chamber is provided with a bottom delivery-orifice *b*. Beneath the orifice *b* the fan-casing C of the pneumatic stacker is supported upon a series of rollers *c*, secured to the framing of the machine and arranged in circular form and engaging the under side of a circular track *c'*, secured to the bottom of the fan-casing, as best seen in Figs. 3, 3^b, and 3^c.

D represents the fan, which is carried upon the upper end of a vertical shaft *d*, supported in an elongated bearing E. This bearing E is shown in Figs. 1^a and 1^b, and consists of two parts secured together by bolts passing through perforated ears *e e*, and each of said parts is provided centrally with a horizontal flange *e'* for engaging the upper faces of supporting-timbers, said flanges having downwardly-extending webs e^2, engaging the inner vertical faces of said timbers, and the bearing is secured rigidly in position by bolts or screws passing through said flanges, webs, and timbers, as will be clearly seen by reference to Figs. 1^a and 1^b.

The bearing proper, E, has at its upper and lower ends boxes closely fitting the shaft *d* and an intermediate recessed portion to reduce the friction and hold lubricating material. The upper end of the bearing E is provided with a turned portion e^3, which is engaged by a central aperture in a casting C', secured to the fan-casing C. This casting C' is conveniently given a dome shape, and at its peripheral edges is formed a worm-wheel C^2, by means of which power is applied to the fan-casing to oscillate the same, as will be hereinafter described. By providing this casting with a central aperture turning about the upper end of the bearing E the fan-casing will be revolved about said bearing as a center and the track *c'* will always engage the supporting-rollers *c*.

The fan D consists of a hub *d'*, secured to the shaft *d* and provided with a number of radially-extending arms having vertically-disposed webs d^2, to which are bolted the horizontal radial arms d^3, which carry the blades d^4 of the fan, and I prefer to form all the parts of the fan of metal secured together by bolts or rivets in any desired or convenient manner.

In using fans in pneumatic stackers considerable difficulty has been heretofore experienced from the tendency of the fan to force some air out into the chamber or hopper into which the straw was delivered and blowing the straw away from the fan. In order to in-

sure a suction of the fan at all points and at all times, I set the fan-blades d^4 at an oblique angle to the top and bottom of the fan-casing, the edge of the blade nearest the straw-chamber being in advance of the other edge and said advanced edge being provided with a horizontally-disposed flange extending in the direction toward which the fan is rotated, the flange being shown in this instance as a curved continuation of the fan-blade, as clearly shown in Fig. 1ª. By this construction the continual suction of the fan is insured and the blowing away of the straw adjacent to the edges of the opening is prevented.

The fan-casing is substantially circular in shape, as shown in Fig. 3, and is provided at one point with a delivery-neck C^3, preferably rectangular in cross-section, to which the telescoping stacker-pipe is attached. The fan D is driven in this instance by means of a bevel-gear d^5, secured to the lower end of shaft d, which engages a similar gear f on a shaft F, provided with a band-pulley f', (see Fig. 3,) driven from any desired source of power, as, for instance, from one of the shafts of the thresher.

The oscillatory movements of the fan-casing are produced by means of a worm g on a worm-shaft G, (see Fig. 3,) and I provide means for oscillating the casing by power. To this end the shaft G is provided with a worm-wheel g', which is secured detachably to the shaft by means of a set-screw g^2. (See Fig. 3.) The worm-wheel g' engages a worm h on a short shaft H, which shaft is also provided with two loose belt-pulleys h' and h^2, which are driven in opposite directions by pulleys k' k^2 on a shaft K by means of a straight and a crossed belt, as shown. The shaft K is provided with a pulley k, which is driven in any suitable manner. The shaft H is also provided with a movable clutch h^3, which slides on a squared portion of the shaft or is otherwise arranged to turn with but to move longitudinally of the shaft, and this clutch is adapted to be automatically thrown into engagement with one or the other of said pulleys h' h^2. In this instance I have shown the clutch provided on its opposite faces with lugs or projections h^4 for engaging the spokes or arms of the loose pulleys.

L represents a clutch-operating lever which is pivoted at l to a suitable casting secured to a part of the thresher-frame. One arm of the lever L engages the clutch h^3, and the other arm is provided with a spring-actuated device for holding the clutch in engagement with one or the other of said pulleys h' h^2. In this instance I have shown the arm of lever L provided with an eye l', through which passes a guide-rod l^2, pivoted at l^3 to the casting l^4, upon which the lever L is pivoted, and a spring l^5 encircles the guide-rod l^2 between its point of pivoting and the eye l', so as to hold the arm of lever L in position to force the clutch h^3 into engagement with one or the other of the pulleys h' h^2. In order to trip the lever L automatically, I provide the track c' on the bottom of the fan-casing with recesses c^2 at very short intervals throughout its length. These recesses are preferably formed in the upper face of the track, which goes against the casing, and thereby sockets are formed to receive pins c^3, having downwardly-extending arms for engaging and operating the lever L.

In Fig. 3 I have shown two of the pins c^3 in position in said sockets to give the casing a very short oscillation. The casing is moved in one direction until one of the pins c^3 strikes the lever L, thereby throwing it over past the point of pivoting l^3 of the guide-rod l^2, when the spring l^5 will throw said arm in the opposite direction, thereby moving the clutch h^3 from one of the loose pulleys into engagement with the other and reversing the direction of travel of the fan-casing. The casing will be moved in the new direction until the other pin c^3 engages the lever L, when the direction will again be reversed, so that the fan-casing may be oscillated continuously and automatically reversed at each end of its travel. By placing the pins c^3 in different sockets of the fan-casing any degree of movement of the fan-casing desired can be produced. If it is desired to operate the fan-casing by hand, the set-screw g^2 on the hub of the worm-wheel g' will be released, and the shaft G can then be driven by means of a bevel-pinion g^3, which engages a similar pinion m on a shaft M, which may be operated by hand by means of a crank m', as shown in Fig. 3. This crank will, of course, be removed when the fan-casing is operated automatically.

The stacker-tube is composed of two tubes, one of which, the supporting-tube, is pivotally secured to the fan-casing, and the other, which I term the "extension-tube," slides within the supporting-tube and forms a telescoping joint therewith. Heretofore it has been common to have the extension-tube fit on the outside of the supporting-tube, and it has been found to be very difficult to so arrange the supports for the tube as to properly and rigidly support the extended tube. I obviate all such difficulties by having the extension-tube slide within the supporting-tube, and thus I am enabled to properly support the tube both in closed and extended positions.

N represents the main or supporting tube, which is composed of sheet metal, the longitudinal edges of which are secured by riveting or otherwise to a wooden bar or rail N' throughout the length of the tube, thus strengthening the construction. It will thus be seen that the lower surface of said bar forms a part of the inner surface of the tube, and the upper face of the bar forms a flat smooth guiding-surface, which is preferably provided with a metal plate n, as shown in Fig. 5, the lateral edges of which project slightly and form a gib.

Upon the top of the metal plate n is a slid-

ing bar O, preferably of wood. At its rear end the bar O is provided with side plates *o o*, which are bolted thereto and have their lower ends bent inward to engage the lower edges of the gib on the bar N′, as shown best in Fig. 6. The plates *o o* are extended upward a short distance and terminate in eyes *o′ o′*, which receive the inner ends of brace-rods o^2 o^2 or stiffeners, which extend therefrom to a plate at the outer end of the bar O to stiffen and strengthen the same. At the outer end of the main tube N is a band *n′*, which encircles the tube and has its upwardly-extending arms bolted to the bar N′, and provided above the bar O with a sprocket-wheel n^2, as shown. The upper arms of this band guide the sliding bar O, and said bar is further guided by a similar band n^3, surrounding the tube N and having its upper part forming a loop to engage and guide the bar O. The tube N will also be provided with bands at intervals to reinforce the same, all of which bands are preferably bolted to the wooden bar N′. At its rear end the bar N is provided with upwardly-extending arms n^4, adjustably secured to said bar by bolts engaging slots in said arms, as shown, the said arms carrying at their upper ends a sprocket-wheel n^5, to the shaft of which is attached an operating-crank n^6. A sprocket-chain extends over the wheels n^5 and n^2 and is secured rigidly at one point to the sliding bar O, so that by turning the crank n^6 the bar O can be moved outwardly or inwardly, as desired.

The extension-tube P is of such diameter as to slide easily within the main tube N and is of slightly-greater length than the latter. At its inner end the tube P is provided exteriorly with a ring or gasket *p* of leather or other suitable material, which has its inner edge skived or beveled and forms a tight joint between the two tubes. The pressure of air within the tubes will force the edges of this ring tightly into engagement with the outer tube and prevent leakage of air, and the leather ring and tube P being of such thin material they will not retard the passage of the straw through the tube. The outer end of tube P is secured to the outer end of bar O, a spacing-block *p′* being interposed between the two and the parts secured together by suitable bolts and also by means of a band p^3, as shown. The lower part of tube P adjacent to its outer end is cut away, as at p^3, to form a delivery-opening, and I prefer to reinforce the edges of this opening by riveting thereto a metal strip or bar, as indicated in Fig. 4.

At the end of the tube P are a pair of caps or hoods Q Q′, which are pivoted to the tube on the same pivots and are connected to the bar O and to each other by a flexible strap *q*. The outermost hood Q′ is provided with arms *q′ q′*, (see Fig. 1,) to which are secured ropes which extent to a point adjacent to the fan-casing, so that the angle at which the hoods are placed may be regulated by said ropes from the ground. These hoods deflect the straw from the tube upon the stack, as will be readily understood.

At the innermost end of the bar N′ is a rectangular casing R of same shape as the delivery-throat of the fan-casing, and this casing R is connected to the tube N by a funnel-shaped section *r*. In connecting the casing R with the throat C^3 of the fan-casing I prefer to employ a hinge construction. (Shown best in Figs. 4, 8, and 9.) On each side of these parts I provide a hinge formed of two plates or castings. (Shown in detail in Fig. 9.) The plate S is secured to the throat or passage C^3 of the fan-casing and is provided with an annular bearing portion or rib *s* on its outer face and with a segmental portion *s′*. The plate S′ is secured to the casing R and is provided with an offset portion to receive the segmental portion of the plate S, said offset portion being also provided with an annular bearing portion consisting of a groove s^2 to engage the annular rib *s* on the plate S. A bolt s^3 connects the two plates of both hinges, passing through the centers of said annular bearing portions, and thus firmly unites the extensible tube with the fan-casing. The segmental portions *s′* of the plates S will prevent any escape of air or straw at the sides as the tube is elevated from a horizontal position, and to prevent the escape of air at the bottom of the joint I provide a spring-plate S^2 of metal or other suitable material, which is secured to the bottom one of the casings C^3 and R and frictionally engages the bottom of the other, as shown in Figs. 1 and 4.

In order to support the stacker-tube, it is only necessary to support the main tube N. To this end I employ a rope T, (see Figs. 4 and 7,) which is formed into a loop surrounding the tube N and engaging a hook or projection *t* on the band *n′*, from whence the rope T passes over suitable pulleys to a winding mechanism (see Fig. 1) on the body of the thresher. By forming the rope T in a loop surrounding the tube N the tube is supported in a more substantial manner than where a single rope is employed. When the device is transported, the tube P is drawn in until the block *p′* strikes the end of the bar N′, thus forming a support for the tube P, and the tube N is supported by the loop T. In addition to the rope I also employ hook-rods T′ T′, secured to the body of the thresher and engaging eyes secured to the bar N′, as shown in Fig. 1. When the stacker is extended, it will be supported by the loop of rope T, and it will be seen that by having the sliding tube within the main tube a very great degree of extension can be obtained, so that the extended tube will be nearly twice the length of the tube when closed. When the device is in operation, I prefer to lower into position pivoted legs U U, as shown in Fig. 1, which steady and support the framing of the machine beneath the fan-casing. These legs

will be folded out of the way when the machine is moved from one place to another. I also further brace and strengthen the framing beneath the fan-casing by means of fixed brace-rods V V, as shown in Fig. 1.

The operation of the machine will be fully apparent from the foregoing description.

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

1. In a pneumatic stacker the combination with the fan-casing and fan, of the main tube communicating with the fan-casing, a sliding extension-tube within the main tube a flexible packing-ring for said sliding tube adapted to engage the inner face of the main tube, said ring extending beyond the end of the sliding tube and adapted to be forced against said main tube by the pressure of air within the same, substantially as described.

2. In a pneumatic stacker the combination with the main tube provided with a strengthening-bar, of a sliding extension-tube within the main tube, a sliding supporting-bar for said sliding tube having a sliding engagement with said strenghtening-bar, supporting devices for said main tube and adjusting devices connected with said sliding bar for extending and retracting said sliding tube, substantially as described.

3. In a pneumatic stacker, the combination with the fan-casing and the delivery-throat thereof, of a stacker-tube, hinge-plates secured to said throat, having annular bearing portions and segmental portions extending into said tube, hinge-plates secured to said tube having annular bearing portions engaging the bearing portions of said first-named plates, a bolt securing said plates together, a spring bottom plate secured to one of said parts and frictionally engaging the other part, and forming with said segmental portions a continuation of the walls of said throat and tube, substantially as described.

4. In a pneumatic stacker, the combination with the fan-casing having a receiving-aperture and a delivery-throat, of a fan having radially-extending arms in a plane parallel to the planes of the top and bottom of the fan-casing, and fan-blades secured to said arms and disposed obliquely to said top and bottom of the fan-casing, each blade having the edge nearest the said receiving-aperture in advance of the other edge substantially as described.

5. In a pneumatic stacker, the combination with the fan-casing having a receiving-aperture and a delivery-throat, of a fan having radially-extending arms in a plane parallel to the top and bottom of the fan-casing and fan-blades secured to said arms disposed angularly to said top and bottom of the fan-casing each blade having its edge adjacent to said receiving-aperture provided with a forwardly-extending flange, extending in the direction in which the fan is rotated, substantially as described.

6. In a pneumatic stacker the combination with the fan-casing provided with a circular supporting-track provided with recesses on the side adjacent said casing and supporting-rollers engaging said track, of devices for imparting an oscillatory motion to said casing including a clutch-shipping lever and pins for engaging the recesses in said track and having portions for operatively engaging said lever, substantially as described.

7. In a pneumatic stacker the combination with the main tube composed of sheet material, of a stiffening-bar having one face forming a continuation of the internal surface of the tube, the longitudinal edges of said sheet material being permanently united to said bar, substantially as described.

8. In a pneumatic stacker the combination with the main tube composed of sheet material and a stiffening-bar having a face forming a continuation of the internal surface of said tube, the longitudinal edges of the sheet material being united to said bar, a sliding extension-tube within said main tube, a sliding bar connected with the extension-tube and having a sliding engagement with the said stiffening-bar, devices connected with said sliding bar for moving the same to extend or retract the extension-tube and supporting devices for the stacker engaging the main tube, substantially as described.

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

WILLIAM W. DINGEE.

Witnesses:
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J. D. KINGSBERY.