

No. 657,341.

Patented Sept. 4, 1900.

S. DYER.

APPARATUS FOR SEPARATING PITH AND FIBER OF CORNSTALKS.

(Application filed Aug. 1, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

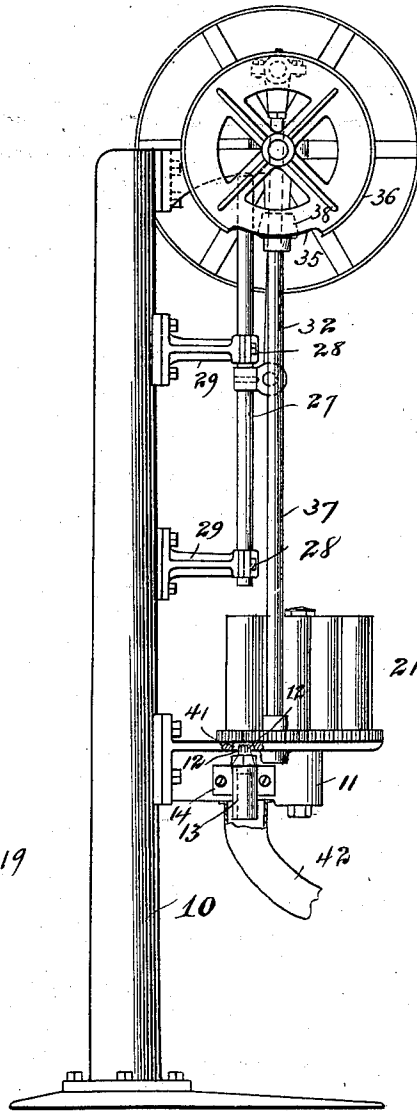


Fig. 5.

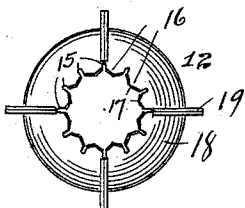
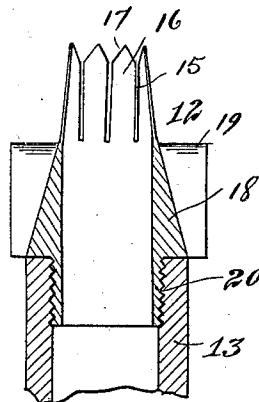


Fig. 2.



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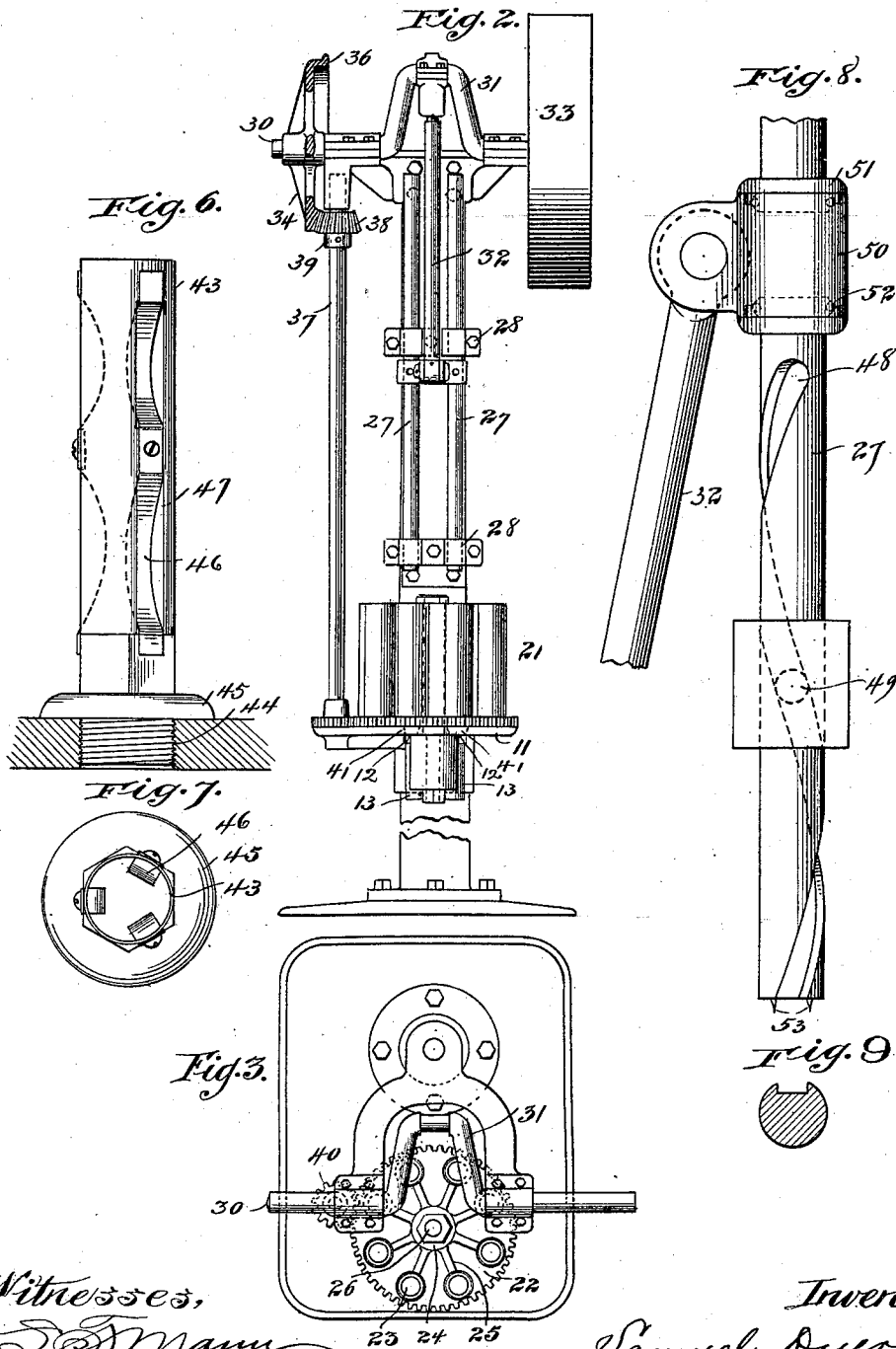
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

SAMUEL DYER, OF MUNCIE, INDIANA, ASSIGNOR OF THREE-FIFTHS TO
RUSH E. EVANS, OF SAME PLACE.

APPARATUS FOR SEPARATING PITH AND FIBER OF CORNSTALKS.

SPECIFICATION forming part of Letters Patent No. 657,341, dated September 4, 1900.

Application filed August 1, 1898. Serial No. 687,413. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL DYER, of Muncie, in the county of Delaware and State of Indiana, have invented a certain new and useful Improvement in Apparatus for Separating the Pith and Fiber of Cornstalks, of which the following is a specification.

This invention relates to apparatus for separating the pith and fiber of cornstalks or the like, and has for its object to provide a mechanism whereby the soft internal part or pith of the stalk may be separated from the hard fibrous outer shell in a rapid and efficient manner; and to this end the invention consists in certain features which I will now describe and will then particularly point out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of the machine embodying my invention; Fig. 2, a front elevation of the same; Fig. 3, a plan view with portions of the gearing omitted; Fig. 4, an enlarged detail view, in vertical section, of one of the separating-knives. Fig. 5 is a detail plan view of the same detached; Fig. 6, an enlarged detail view in elevation of a modified form of one of the holders or guides detached; Fig. 7, a plan view of the same; Fig. 8, an elevation of a modified form of one of the plungers, and Fig. 9 a detail sectional view of the same.

In said drawings the machine is shown as mounted on an upright or supporting-frame 10, provided with a bracket or table 11, which supports the cutters or knives, of which two are employed in the present instance, which are indicated at 12 and are located one on each side of the table, being mounted in tubular supports 13, connected to said table by means of brackets 14, as shown in Fig. 1 of the drawings. Each knife is tubular in form, its upper portion being thin and elastic and being divided by a plurality of longitudinal slits 15 into a corresponding number of tongues 16. Each tongue is provided at its upper end with a V-shaped cutting edge 17. The body of the knife below this thin elastic upper portion is conical in form, as indicated at 18, increasing in diameter downward, and this portion of the body is provided with a plurality of radial cutters 19, four being

shown in the present instance, although their number may be varied as desired. The knives may be secured or connected to their tubular supports 13 in any suitable manner, and in the present instance I have shown this connection as effected by providing the lower portion of each knife with an externally-threaded extension 20, which screws into the correspondingly internally threaded upper end of the support, thus rendering the knife readily removable and replaceable. Above the knives 12 there is mounted on the bracket or table 11 a revolving carrier 21, which in the form shown in Figs. 1, 2, and 3 of the drawings comprises a circular base 22, provided with gear-teeth on its periphery and a plurality of vertical tubular guides 23, the openings of which extend through the base 22. These guides may be conveniently cast in one piece with the base 22 and with the central hub 24 of the carrier, to which they are joined by integral radial webs 25, and in Figs. 1, 2, and 3 I have illustrated this construction. The carrier as a whole is mounted upon a vertical axis 26, arising from the table 11. Any desired number of tubular guides may be employed, according to the dimensions of the carrier, it being only requisite that they should be arranged in a circle at distances apart equal to the distance between the two knives 12. In the present instance I have shown eight of these guides.

Above the carrier 21 are located vertical plungers 27, corresponding in number with the knives 12, two being shown in the present instance. These plungers are located in the axial lines of the knives 12 and reciprocate vertically in those lines, being guided and supported by suitable guides 28, mounted on brackets 29, extending outward from the upright or frame 10. Motion is imparted to these plungers from a crank-shaft 30, provided with a crank 31 of a throw sufficient to cause the plungers to pass downward entirely through the tubular guides 23 and almost to the knives 12. This crank is connected to the plungers 27 by means of a pitman 32, and the crank-shaft is provided with a driving-pulley 33 or other suitable means of applying the power to said shaft.

In order to impart an intermittent rotary

motion to the carrier 21, there is mounted on the shaft 30 a bevel gear-wheel 34, which has a short gear-segment 35 upon a comparatively-small portion only of its face, the remainder of the wheel being blank and being provided with a flat annulus 36, which is interrupted or cut away at that portion of the wheel where the gear-segment 35 is located. A vertical shaft 37, extending downward to the table 11, is provided at its upper end with a bevel-pinion 38, which meshes in the gear-segment 35 and which is provided with a flattened hub 39, which is adapted to bear upon the annulus 36. At its lower end the shaft 37 is provided with a pinion 40, which meshes with the gear-teeth of the base-plate 22 of the carrier.

The apparatus thus constructed operates in the following manner: The cornstalks to be operated upon are cut into lengths of sufficient size to permit them to be inserted into the tubular guides of the carrier 21, where they are supported by the top of the table 11, over which the carrier travels. This table is provided at points immediately above the knives 12 with apertures 41 to permit the stalks to pass from the carriers to said knives. The various guides or chambers of the carrier having been supplied with sections of stalk, one for each guide, the apparatus is placed in motion and the plungers 27 descend and pass into and through the guides 23, which lie underneath them and above the knives. The two sections of stalk in these guides are thereby forced downward through the apertures 41 onto the tubular knives 12. The cutting edges 17 at the upper ends of these knives enter the stalk at points immediately between the pith and the shell, and as the stalk is forced downward these cutting edges separate the pith from the shell, their elasticity being sufficient to permit them to follow the dividing-line and to be deflected inwardly by contact with the hard surfaces of the shell, so as to properly separate the shell and pith at their junction. The pith passes downward through the tubular interior of the knives, while the shell passes downward outside of the knives and encountering the radial cutters 19 is split longitudinally into a number of sections. This splitting action is further aided by the conical body 18 of the knife, which forces the sections outward away from each other and causes them to pass outside of the tubular supports 13. The pith passes through the interior of these tubular supports and may be withdrawn or collected separately from the split shell by any suitable means. In Fig. 1 of the drawings I have shown for this purpose a tube 42, connected at one end to each of the tubular supports 13, these tubes being connected at their other ends to any suitable means for exhausting the air, so as to draw the pith by suction to a suitable point of discharge. During this motion of the plungers and while they are in engagement with the carrier the

flattened hub 39 of the pinion 38 is in contact with the annulus 36 of the gear-wheel 34, and the carrier is consequently held stationary. Upon the upward movement of the plungers as soon as the same have passed clear of the carrier the pinion 38 engages the gear-segment 35, and as the cutaway portion of the annulus is opposite the hub of the pinion at this time rotary motion is imparted to the shaft 37 and to the carrier, which is advanced a sufficient distance to bring the next two chambers or guides above the knives 12, whereupon the carrier's motion is arrested, and it is locked in position. The plungers then again enter the carrier, and the stalk-sections contained in the two chambers exposed to their action are operated upon as before described. It is understood, of course, that the guides or chambers of the carrier will be fed, either automatically or by hand, with fresh stalk-sections as fast as their contents are discharged by the plunger.

It will be seen that by means of the apparatus above described the pith or soft portion of the cornstalks may be quickly and thoroughly separated from the outer fibrous shell or hard portion thereof, and the stalks may thus be put into condition for the employment of their separate constituent parts to such end as they may be adapted. For instance, the pith may be made into cellulose, while the fiber is well adapted for the manufacture of paper. The machine may, however, be employed to operate upon material other than cornstalks, and its details of construction may be varied without departing from the principle of my invention. For instance, although I have shown in Figs. 1, 2, and 3 a carrier in which the tubular guides or chambers are cast in one piece with the remaining portions of the carrier, I may construct these guides or chambers separately in order that they may be removable, so as to enable me to change them and supply chambers or guides of diameter corresponding to the diameters of the stalks operated upon. Such a construction I have shown in Figs. 6 and 7 of the drawings, in which the guide or chamber has a tubular body 43, threaded at its lower end, as shown at 44, to adapt it to screw into a corresponding threaded aperture in the base-plate 22, a collar 45 being provided to rest upon said base-plate and more firmly support the guide. In these figures I have also shown the guide as provided with internal spring guide-fingers 46 at least three in number and extending into the interior of the guide through slots 47 in the body thereof. These elastic or yielding guide-fingers serve the purpose of properly centering relatively to the cutter a cornstalk of smaller diameter than the interior of the guide itself. I have also shown in Figs. 8 and 9 means for imparting to the plungers 27 a rotary as well as a reciprocating motion in order to similarly rotate the stalk-sections, and thus assist the operation of the knives. In this construction the plunger is shown as

provided with a spiral groove 48, and there is mounted in one of the guides a fixed pin or roller 49, which extends into said groove and thereby imparts to the plunger a rotary motion during its reciprocation. In this case the pitman 32 is connected to the collar 50, which is mounted loosely on the plunger 27, so as to permit this latter to rotate therein, while longitudinal movement along with the collar 50 is obtained by means of two fixed collars 51, secured to the plunger 27 on opposite sides of the collar 50. If desired, anti-friction-balls 52 may be interposed between the collars 50 and 51. With this construction I may, if desired, provide the plunger upon its lower or operating face with teeth or projections 53 to engage the stalks. It is of course obvious that the number of knives and plungers may be varied, as desired, and other features of construction similarly modified, and I therefore do not wish to be understood as limiting myself to the precise details of construction hereinbefore set forth and shown in the drawings.

I claim—

1. An apparatus of the character described, comprising a vertically - arranged tubular knife or cutter adapted to operate between the pith and shell of a cornstalk, a carrier intermittently rotating around a vertical axis and having a plurality of tubular guiding-chambers which successively present the stalk-sections to the knives or cutters, and a vertically - reciprocating plunger for positively and successively forcing the stalk-sections from said chambers against the knife or cutter while the carrier is stationary, substantially as described.

2. An apparatus of the character described, comprising a vertically - arranged tubular knife or cutter adapted to operate between the pith and shell of a cornstalk, a horizontal table having an aperture registering with said knife, a carrier intermittently rotating around

a vertical axis above said table and having a plurality of tubular guiding-chambers which successively register with said aperture, and a vertically - reciprocating plunger for positively and successively forcing the stalk-sections from said chambers through the said aperture against the knife or cutter while the carrier is stationary, substantially as described.

3. An apparatus of the character described, comprising a vertically - arranged tubular knife or cutter adapted to operate between the pith and shell of a cornstalk and to split the shell, a carrier intermittently rotating around a vertical axis and having a plurality of tubular guiding-chambers which successively present the stalk-sections to the knives or cutters, a vertically - reciprocating plunger for positively and successively forcing the stalk-sections from said chambers against the knife or cutter while the carrier is stationary, and a tube connected with the lower end of the tubular knife or cutter, whereby the pith is delivered into said tube and the split shell separately discharged from the machine by gravity, substantially as described.

4. An apparatus of the character described, comprising a plurality of vertically - arranged tubular knives or cutters adapted to operate between the pith and shell of a cornstalk, a carrier intermittently rotating around a vertical axis and having a plurality of tubular guiding-chambers which successively present the stalk-sections to said knives or cutters, and a plurality of vertically - reciprocating plungers corresponding in number to the knives or cutters and adapted to positively and successively force the stalk-sections against the knives or cutters while the carrier is stationary, substantially as described.

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