F. REICHMANN.

DEVICE FOR OPENING STRAW AND OTHER VEGETABLE MATTER FOR SPINNING PURPOSES.

APPLICATION FILED JAN. 25, 1915.

1,162,191.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 1.

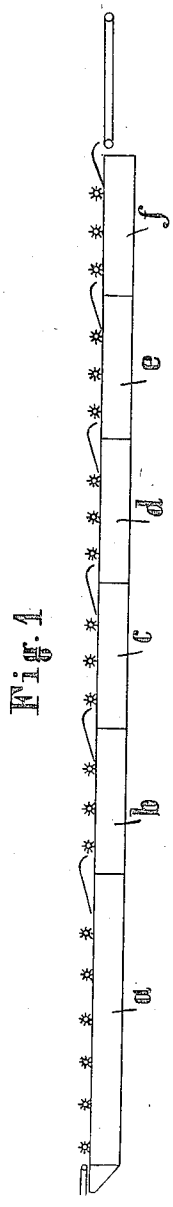


Fig. 1

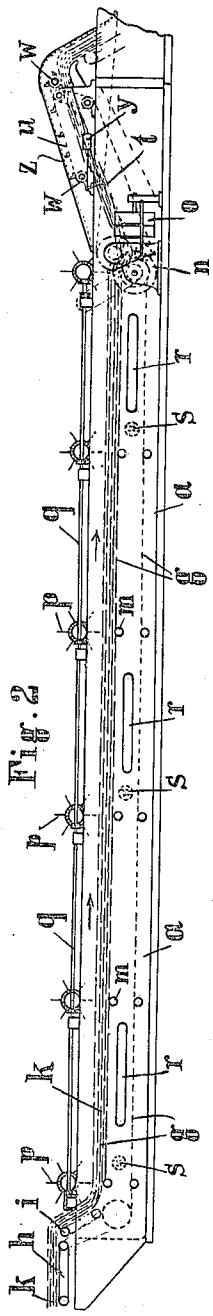


Fig. 2

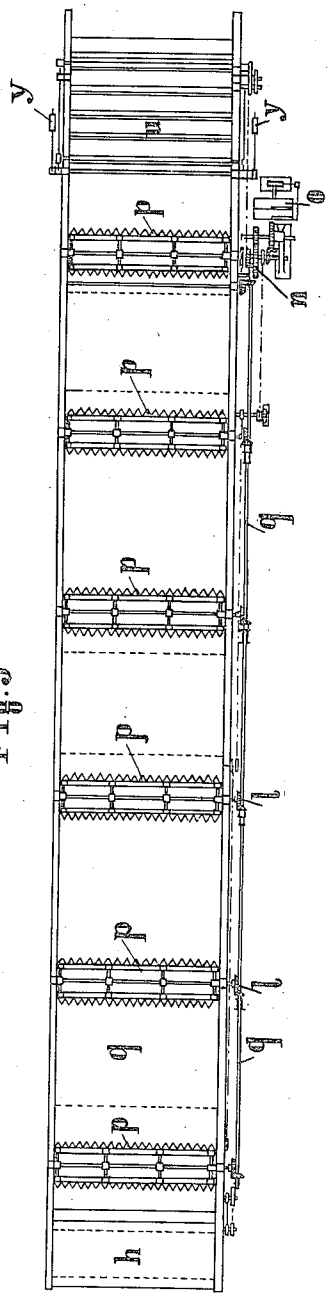


Fig. 3

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2 SHEETS—SHEET 2.

Fig. 4

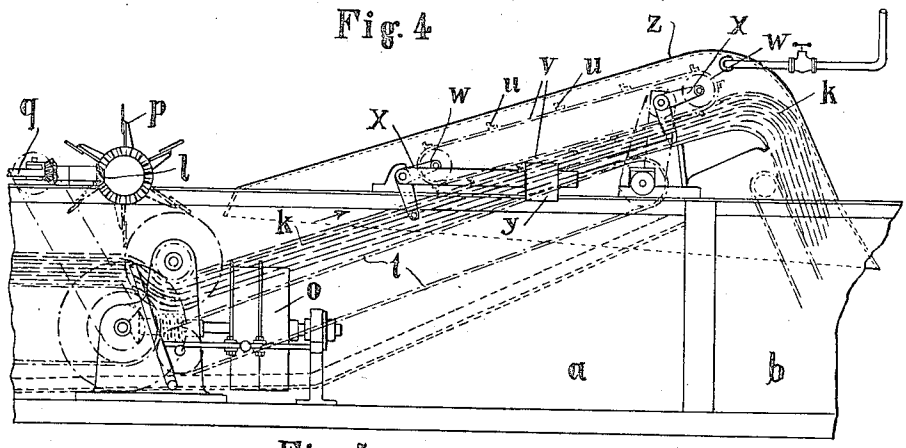


Fig. 5

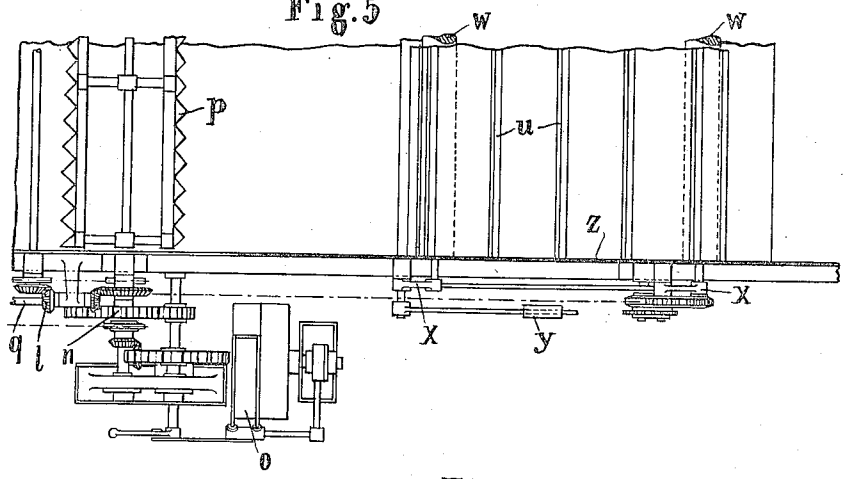
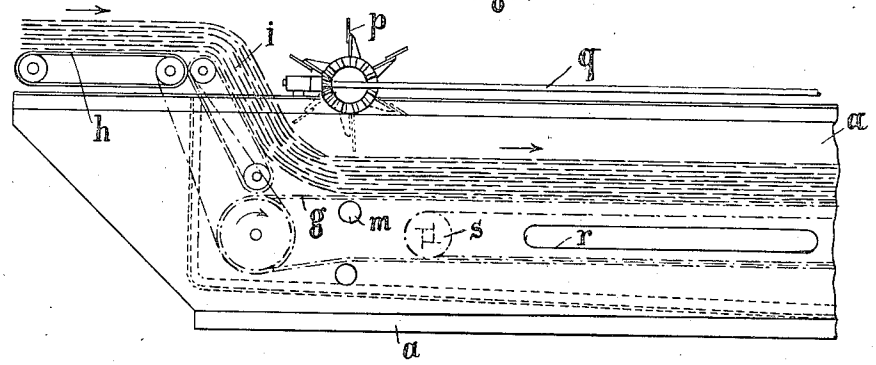


Fig. 6



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UNITED STATES PATENT OFFICE.

FRIEDRICH REICHMANN, OF BARMEN, GERMANY.

DEVICE FOR OPENING STRAW AND OTHER VEGETABLE MATTER FOR SPINNING PURPOSES.

1,162,191. Specification of Letters Patent. Patented Nov. 30, 1915.

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To all whom it may concern:

Be it known that I, FRIEDRICH REICHMANN, a subject of the King of Sweden, residing at Barmen, Germany, have invented an Improved Device for Opening Straw and other Vegetable Matter for Spinning Purposes, of which the following is a specification.

My invention has for its object a device for opening straw and other vegetable material, as for instance grass club-rush, bast and the like for the purpose of obtaining fibrous material for spinning particularly by means of a process which consists in the raw material being first boiled in a ½ to 2° Bé. solution of soda until the gliadin is dissolved and the straw can be decomposed into its fibers, the straw after the removal of this solution being treated with cold caustic soda or caustic potash lye of 15–20° Bé. or of even higher concentration, so that the individual fibers become curled and separated from one another, the fibers after this treatment and after being rinsed with warm water being further treated with a solution of hydrofluoric acid in order to lixiviate the silicic acid contained in them and finally being treated with water to which small quantities of ammonia or magnesium chlorid have been added and being again rinsed and neutralized.

According to my invention the new device or apparatus consists of a group of boilers or troughs corresponding with the number of the single operations and which are arranged successively in a line. On the bottom of each trough an inclined transporting band is located carrying the material automatically lengthwise through the liquid within the trough, said material being then raised from the said boiler and fed into the next trough and moved therein in the same manner. Above the material are mounted on the top of the boilers and spaced apart a number of feeding wheels, by which the material is kept below the liquid surface and at the back extremity of the boiler over the inclined portion of the transporting band is placed a second band or strap between which the material is elevated and pressed out before it is delivered into the next trough. The length of each trough exactly conforms to the period which the treating of the material requires, so that no loss of time takes place and a perfect, uniform and uninterrupted working is obtained.

Preferably I provide a device by which the hot material raised from the boiling trough before its delivery into the lye trough is cooled, or by which the lye may be constantly kept cool. From tests it has been stated that the treating of the material is the more perfect, the lower the temperature of the lye having the same concentration is kept so that the same result is obtained with a weaker lye of low temperature as with a strong lye of high temperature.

My invention is fully illustrated on the accompanying drawings, on which—

Figure 1 is a side view of the complete apparatus; Fig. 2 shows the first boiler in an enlarged scale; Fig. 3 is a top view of Fig. 2; Fig. 4 represents the back portion of a boiler in side view in an enlarged scale; Fig. 5 is a top view thereof; Fig. 6 shows the front part of the boiler in a side view.

a, *b*, *c*, *d*, *e* and *f* are boilers or troughs in which the raw material is treated and which in the present example are arranged successively in a line. In the first trough *a* the material is boiled in a weak solution of alkali, the second trough *b* serves for cooling the hot material coming from the trough *a*, and contains for this purpose a cooling liquid. The third trough *c* is filled with a lye of higher concentration, in which the single fibers are curled and separated, in the trough *d* a rinsing of the material takes place whereupon in the following trough *e* the material is treated with a solution of hydrofluoric acid for the purpose of removing the silicic acid contained in the material which finally in the last trough *f* is again rinsed and neutralized.

Preferably for cooling the rinsing liquid of trough *d* the dilute cold lye is used, it being passed through the trough *b* before it is guided for further use into the boiler *a*.

Within the several troughs is, as seen in Figs. 2 to 6, arranged a transporting belt *g*

corresponding with the breadth of the same and being wholly covered by the liquid. On the front end of the first trough *a* is mounted a horizontal transporting belt *h* Figs. 2, 6 and adjacent thereto a second but inclined transporting belt *i* by which the material for instance straw in a thick layer is fed into the boiling trough *a* upon the band *g* by which it is slowly caused to travel through the liquid and boiled. The said band *g* is supported at certain distances by rollers *m* and is driven by means of the toothed gear *n* from the pulleys *o*. In the top of the troughs are located at certain distances a number of revolving paddle wheels *p* the combshaped paddles of which dip into the liquid, said wheels being rotated by miter wheels *l* from a common shaft *q* in such a manner that they hold the material in contact with the liquid and at the same time move it forward. Between the upper and lower half of the band *g* traversing channels *r* are constructed in the trough *a* through which heating gases may be led in order to heat and boil the material. Near the said channels stirring devices *s* are provided, keeping the liquid in constant movement to obtain a good exchange of heat. The rotation of the said stirring means is done by means of suitable gear from the pulleys *o*. At the other extremity of the trough the band 9 is continued by an inclined belt *t* by which the boiled material *k* is elevated from its trough and fed into the adjacent trough in the direction of travel of the material. Above said belt *t* is mounted another transporting belt *v* provided with transverse rails *u* the rollers *w* of which are carried by angle levers *x* on which act the adjustable weights *y* that press the upper band *v* down upon the lower *t* in order to obtain a secure feeding of the material upon the inclined belt to free it from liquid by the pressure. The following troughs *b*, *c*, *d*, *e* and *f* are in the same manner fitted with the described parts, they may however be shorter according to the operating time required in each trough.

The conveyance of the hot material from the boiler *a* into the cooling vessel *b* is preferably done within a steam atmosphere in order to prevent the influence of the oxygen of the air and a weakening of the fiber which is impregnated with the hot solution of soda. For this purpose the raised end of the discharging belt of the boiler *a* is covered with a dome or hood Z, and a pipe controlled by a hand valve and communicating with a source of steam-supply (not shown) and the interior of the dome Z allows the admission of steam into the interior of said dome Z, see Fig. 4, the steam escaping under the edge of said dome.

The single treating liquids may partly be used repeatedly, as for instance the rinsing liquid, which is drawn off from the trough *d* after the treating with cold lye of caustic soda or caustic potassium may be passed into the trough *a* for renewing there the weak solution of caustic soda which is used for boiling and so on.

It may be noted that the trough *b* may be omitted and instead thereof trough *c* may be fitted with a cooling appliance for the concentrated lye contained therein and said appliance may be arranged within the said trough or outside the same so that the lye can circulate through it.

What I claim and desire to secure by Letters Patent is:

1. A device for producing spinning fibers from straw and other vegetable matter whereby the same is boiled and treated successively with a number of liquids or lyes, comprising a series of troughs placed adjacently in line, a transporting band arranged within said troughs, said band being inclined toward the back extremity of the trough in order to carry the material lengthwise through the conduits, elevate it from the same and feed it into the adjacent trough as described and for the purpose set forth.

2. A device comprising a series of troughs, each of them having mounted upon it a number of paddle wheels, said wheels having broad wedge-shaped teeth irregularly fitted on each wheel, which in pressing down the material separate the same as described and for the purpose set forth.

3. A device comprising a series of troughs, a transporting band within each trough and a second band mounted over the inclined exit portion of said band for the purpose described and set forth.

4. Apparatus for separating and treating vegetable fibers consisting of a series of troughs in which the material is subjected to different kinds of treatment, in part by hot liquid, means for using said liquid again by cooling it, means for returning it to the first of said troughs, in which boiling and separation take place, and means for conveying said material to the several troughs in succession.

5. Apparatus for separating and treating vegetable fibers comprising a trough or receptacle in which the material is boiled and separated, a lye-containing trough for subsequently acting on said material and an interposed trough containing cooling liquid for reducing the temperature of the material before it is subjected to the action of the lye and means for conveying the said material to the several troughs of the series in succession.

6. Apparatus for separating and treating vegetable fibers comprising a series of

troughs arranged in succession and adapted to contain divers liquids for acting variously on the material presented thereto, elevating and discharging mechanism for transferring such material from the first trough of the series to the second trough of the series, a dome covering such mechanism, and a pipe supplying steam to the interior of said dome.

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