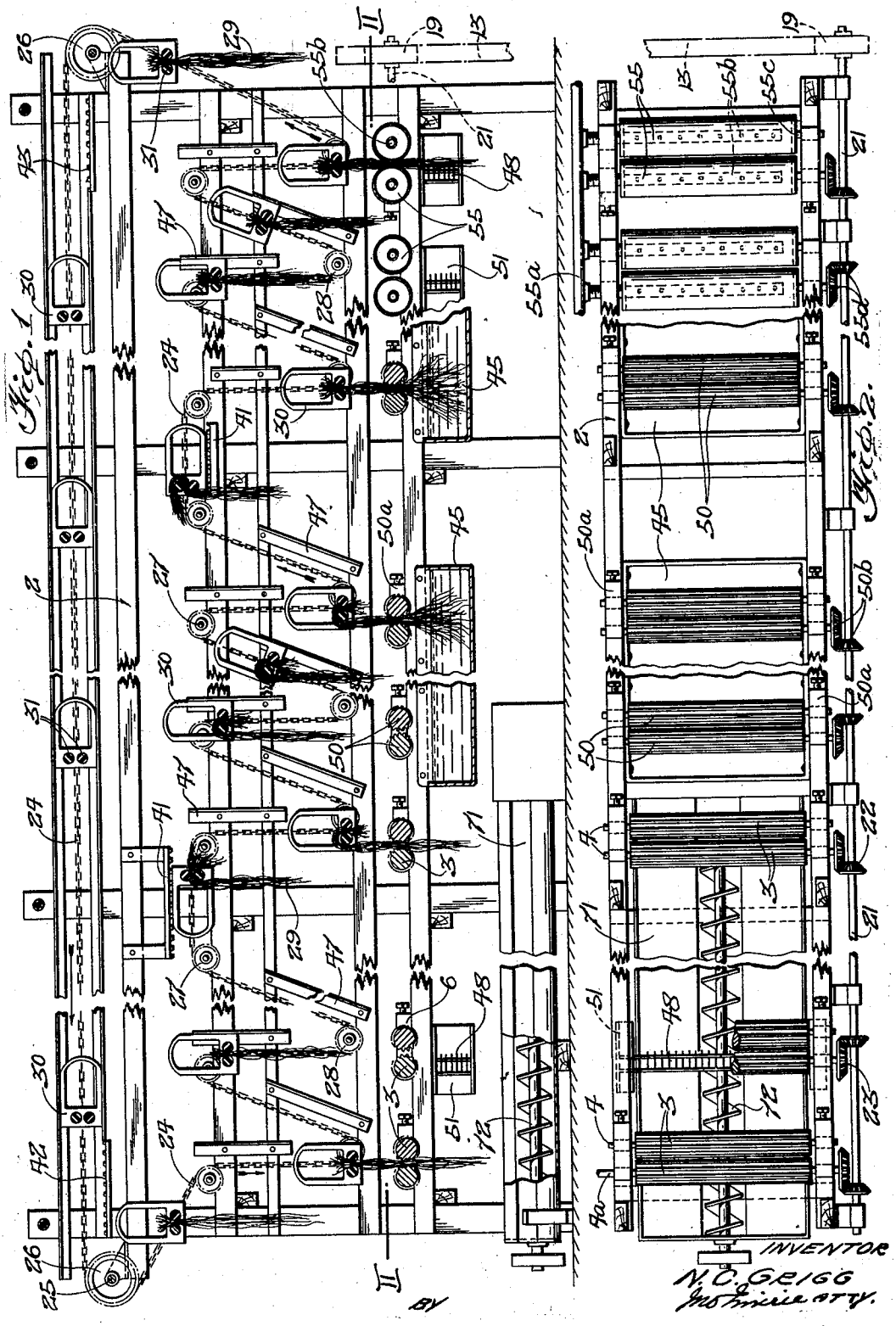
Nov. 4, 1930. N. C. GRIGG 1,780,480

METHOD OF AND APPARATUS FOR DECORTICATING, RETTING, AND SCUTCHING FLAX

Filed Jan. 12, 1929 3 Sheets-Sheet 1



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METHOD OF AND APPARATUS FOR DECORTICATING, RETTING, AND SCUTCHING FLAX

Filed Jan. 12, 1929 3 Sheets-Sheet 2

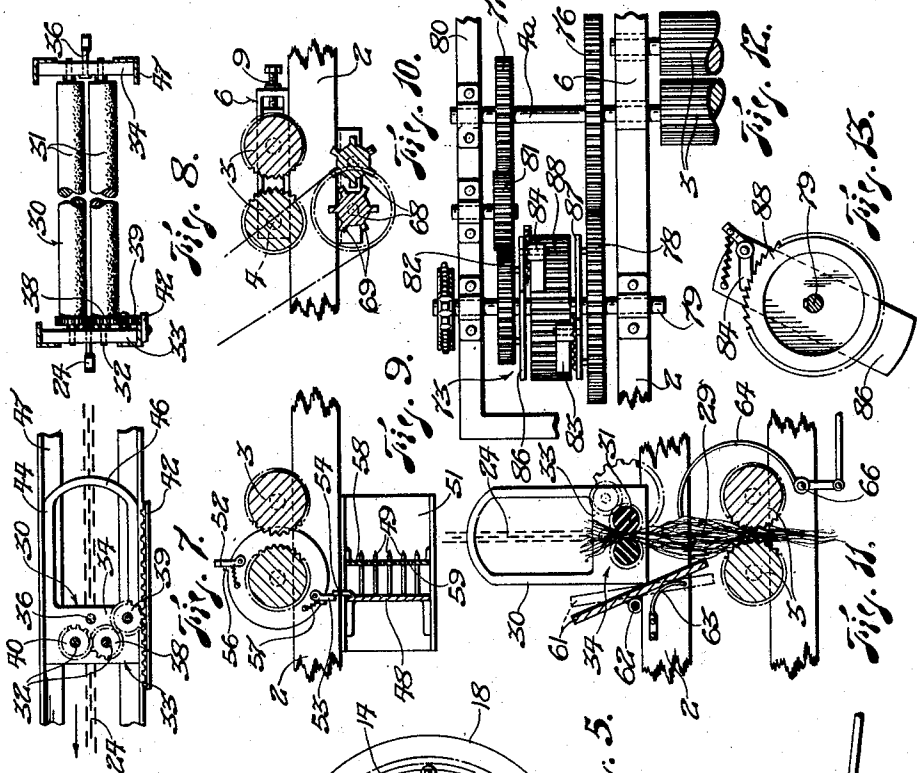


Fig. 8.



Fig. 10.



Fig. 12.



Fig. 13.



Fig. 7.



Fig. 9.



Fig. 11.

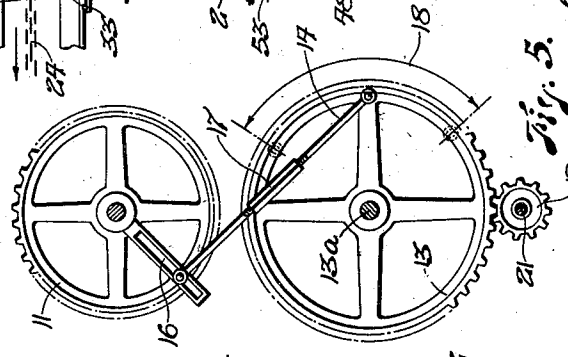
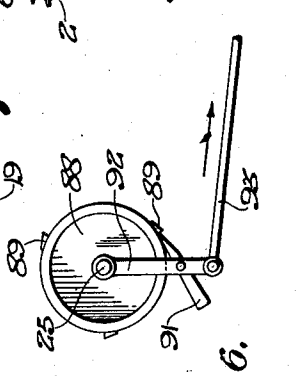


Fig. 5.



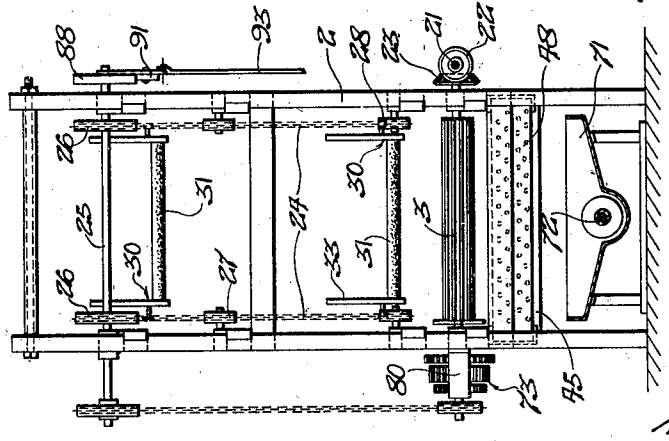


Fig. 6.

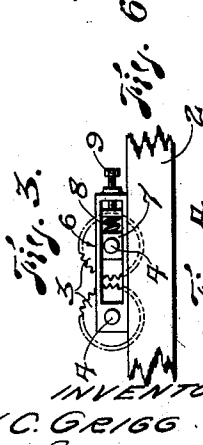


Fig. 3.

Fig. 4.

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Filed Jan. 12, 1929 3 Sheets-Sheet 3

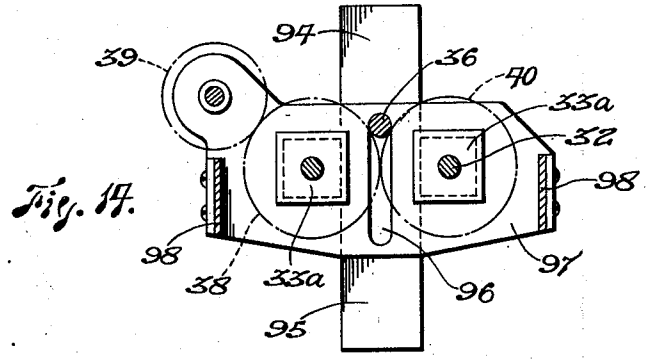


Fig. 14.

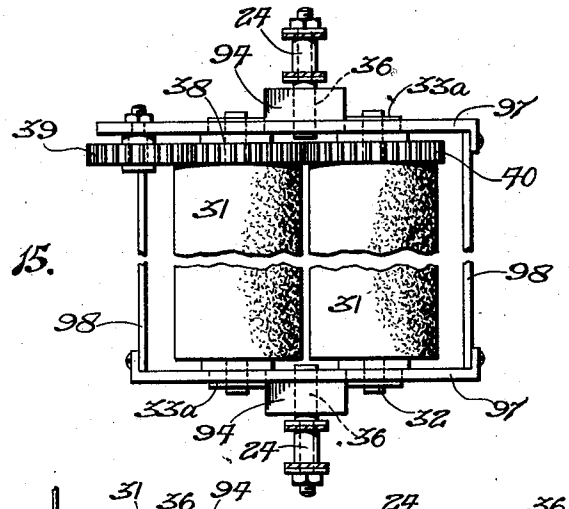


Fig. 15.

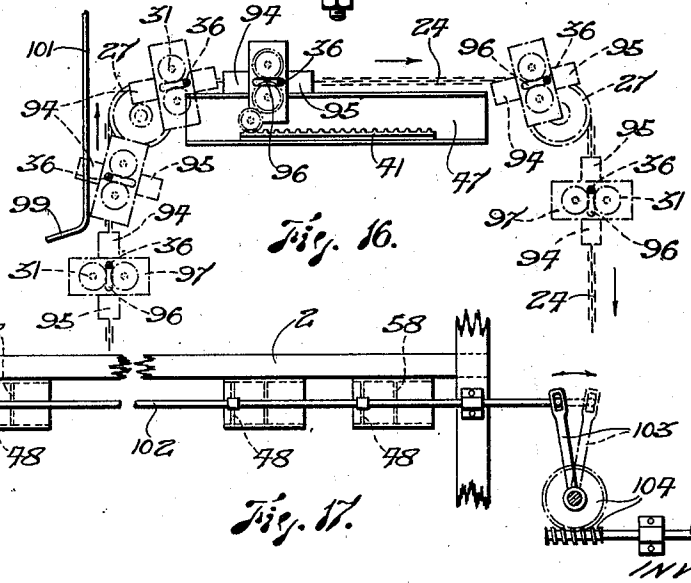


Fig. 16.




Fig. 17.

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# UNITED STATES PATENT OFFICE

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## METHOD OF AND APPARATUS FOR DECORTICATING, RETTING, AND SCUTCHING FLAX

Application filed January 12, 1929. Serial No. 332,073.

This invention relates to a method of and apparatus for decorticating, retting and scutching or combing flax, and one of its objects is to provide an improved method whereby the processes of decorticating the raw flax, retting and drying the decorticated flax and scutching the retted decorticated flax are automatically carried out in proper sequence. By following the method of the invention time and labour is considerably reduced, the rate of production is accelerated and a continuous delivery of completely treated material is obtained. The method of the invention is characterized by certain individual steps and by combinations of steps as will be referred to hereinafter.

Another object of the invention is to provide apparatus for carrying the aforesaid method into effect.

Referring to the drawings which form part of this specification:—

Figure 1 is a somewhat diagrammatic side elevation of apparatus for treating flax in accordance with the invention. The apparatus is longitudinally contracted and certain parts are shown in section for convenience of illustration.

Figure 2 is a sectional plan on the line II—II of Figure 1.

Figure 3 is an end view of the apparatus.

Figure 4 is a detail view, in side elevation, of means for supporting co-acting decorticating or crushing rollers.

Figure 5 is a detail view of automatically reversing mechanism for driving the crushing rollers.

Figure 6 is a detail of means for correcting any lag in the travel of a conveyor by which the material is carried towards and from the decorticating, retting and scutching devices.

Figures 7 and 8 are detail views of a flax holder, a series of which are mounted on the conveyor.

Figure 9 is an enlarged cross section of a pair of crushing rollers and a scutching device.

Figure 10 is an enlarged cross section of a pair of crushing rollers and a modified scutching device.

Figure 11 is an enlarged cross section of the first pair of crushing rollers and adjacent parts of the machine, showing means for directing sheaves of flax to the rollers.

Figure 12 is a plan of gearing for converting two way rotation of the crushing rollers into one way rotation of a conveyor driving shaft.

Figure 13 is a face view of a portion of the gearing seen in Figure 12.

Figure 14 is a detail of a preferred form of a reversible holder for the flax.

Figure 15 is a contracted plan of Figure 14.

Figure 16 is a diagrammatic side view illustrating the reversing of a holder as seen in Figures 14 and 15.

Figure 17 illustrates means for reciprocating the combing devices.

In accordance with this invention the flax is automatically and continuously fed forwards to various devices whereby it is successively decorticated, retted, dried and scutched, and is then delivered in the finished state ready for the market. The decorticating treatment crushes the flax, the retting treatment dissolves out and removes the gummy matter from the flax, after which the flax is dried by artificial heat and pressure and is then scutched preferably by a combing action. In some instances the flax may be subjected to an initial scutching between the decorticating and the retting treatments.

An important feature of the improved method is that sheaves of the flax are carried forwardly during and between the various treatments by a continuously moving conveyor and are automatically discharged therefrom at the delivery end. Another feature is that the positions of the sheaves of flax are at appropriate intervals reversed on the conveyor to thereby ensure that the sheaves are treated throughout the whole of their length. The above and other features of the method will, however, be more fully described with reference to the apparatus shown in the drawings.

The apparatus includes a framework 2 on which are mounted a series of co-acting pairs of decorticating or crushing rollers 3. These

rollers extend transversely of the framework at appropriate intervals and are preferably longitudinally fluted. The flutings of the pairs of rollers 3 may increase progressively in pitch and depth from the first pair to the last pair, which construction is so obvious as to avoid the necessity of specific illustration thereof.

The axles 4 of the rollers 3 may be supported at each end in slotted bearings 6 having movable blocks 7 provided with adjustable devices comprising a spring 8 and screw 9, as seen in Figure 4, whereby the distance and pressure between the rollers of each pair may be regulated as required.

Driving mechanism is provided whereby the rollers 3 may be alternately rotated in opposite directions so that the flax will be drawn first in one direction and then in the other between the rollers. Such mechanism is indicated in Figure 5 and includes a main driving wheel 11 which is rotated continuously in one direction, a second wheel 13 preferably of larger diameter than the driving wheel 11, a connecting rod 14 extending between said wheels, and adjustment means comprising a slotted arm 16 and turnbuckle 17 whereby continuous rotation of the wheel 11 in one direction imparts oscillating motion through the arc 18, to the second wheel 13.

This oscillating movement may be transmitted to the crushing rollers 3 by means of a pinion 19 mounted on a shaft 21 and meshing with the wheel 13, said shaft 21 being provided with a plurality of bevel gears 22 adapted to engage gears 23 attached to the ends of the axles 4 of the rollers as seen in Figures 2 and 3. If desired only one roller of each pair need be positively driven, the other roller being idle but free to rotate. The bevel gears 22 may be arranged alternately on the shaft 21, as seen in Figure 2, so that alternate pairs of the rollers 3 will be driven in opposite directions.

Extending longitudinally of the framework 2 above the decorticating, retting and scutching devices is a conveyor which may consist of a pair of laterally spaced chains or bands 24. The upper or rearwardly moving portions of the chains are adapted to engage driving sprockets 26 which are located respectively at the feeding and delivery stations of the apparatus. The lower or forwardly moving portions of said chains pass around upper and lower sets of guide sprockets 27 and 28 preferably arranged in such a manner that the flax which is attached to the chains is carried alternately vertically downwards towards the respective decorticating, retting and scutching devices and diagonally upwards therefrom. The upper set of sprocket wheels 27 may be driven by suitable means from the wheel 13.

In order to attach the flax in stricks or sheaves 29 to the conveyor 24 I provide on the latter a series of holders 30 (see particularly Figures 7 and 8) each of which may comprise a pair of small transverse gripping rollers 31, preferably of rubber or having rubber sleeves, the spindles 32 of which may be mounted in slotted bearing blocks 33 having adjustable spring devices (not shown) similar to those previously described for supporting the crushing rollers 3. By this means the sheaves 29 may be held adjacent one end with the desired degree of pressure between said gripping rollers 31. The bearing blocks 33 may be mounted on carriers 34 pivotally attached, as at 36, to the conveyor chains 24 so that the carriers and parts attached thereto may swing in relation to the conveyor for a purpose which will be apparent hereinafter.

One of the spindles 32 of each pair of gripping rollers 31 may be provided at either or both ends with a toothed pinion 38 meshing with a second pinion 39, which is adapted to engage toothed racks 41 (Figure 1) located in the path of said pinion 39 at suitable positions in the length of the forwardly moving portions of said conveyor chains 24 so that, after the flax has been sufficiently treated from its free end, it may be automatically moved lengthwise by and through the rotated gripping rollers 31, and gripped adjacent the treated end. This enables the material to be further treated from the untreated end and ensures that the whole of the material is effectively treated. One of the racks is preferably arranged so that after the flax has been passed between one or more pairs of the crushing rollers 3, it is reversed in its holder so as to be treated from the other end by a subsequent pair or pairs of rollers 3. Other racks 41 may be arranged to reverse the position of the flax in its holders between successive retting treatments and between successive scutching treatments.

Additional racks 42, 43, may be conveniently arranged at the feeding and delivery stations of the apparatus to thereby automatically rotate the gripping rollers 31 as they approach said stations. To apply the flax to the gripping rollers it is merely necessary for an operator to feed a sheave lengthwise to the space between two of the gripping rollers as they approach the loading station at the left hand side of Figure 1. The temporary rotation of the rollers, due to rack 42, automatically draws the material between them by which it is tightly gripped. In a similar manner the rotation of the rollers 31 as they pass by the delivery station causes the treated material to be automatically discharged.

It is desirable to positively rotate both gripping rollers 31 of each pair, and for this reason the pinion 38 on one roller may mesh with a pinion 40 on the other roller.

In order to maintain the gripping roller carriers 34 in proper positions at all parts

of the conveyor, each carrier may have side lugs or extensions 44 connected by a curved nose 46. In travelling, the curved nose of each carrier first makes contact with appropriately disposed guide rails or members 47, which swing the carriers about their pivots 36 so as to bring the side lugs 44 into sliding contact with said guide rails 47.

After the flax has been passed between a sufficient number of pairs of crushing rollers it is subjected to retting treatment, which is preferably accomplished by dipping the flax into a retting liquid and then squeezing the flax to thereby express the glutinous matter which has been separated by the retting liquid. The retting liquid may be contained in tanks 45 supported by the framework 2. Pairs of squeezing rollers 50, supported by bearings $50^a$, may extend transversely across the tops of the tanks, these rollers, or one of each pair, being rotated alternately in opposite directions through the medium of bevel gears $50^b$ from the shaft 21.

When the decorticated flax approaches each pair of the rollers 50 the latter are rotating in such direction that the flax will be directed downwardly by and between the rollers into the retting liquid. As the flax commences to rise, through the holder 30 rounding the respective lower guide sprocket 28, the direction of rotation of the rollers 50 is reversed so as to facilitate the withdrawal of the flax from the liquid, and at the same time express the glutinous matter and most of the retting liquid from the flax. The rollers 50 are shown fluted, but as their purpose is merely to squeeze the flax, they may be plain if desired.

Each sheave of flax may undergo several retting treatments, and, by the appropriate arrangement of a rack 41 adapted to engage the pinion 39 on the respective holder 30 as aforementioned, the position of the sheave in relation to the gripping rollers 31 may be automatically reversed between successive retting actions. If the finally retted flax is too moist it may be dried before being scutched or combed. Drying is preferably effected by the combined action of heat and mechanical pressure, by causing the retted flax to pass between heated rollers 55. These drying rollers may be hollow and heated internally by gas, steam or other heating medium which may be conveyed to the rollers by a main supply pipe $55^a$ and branch pipes $55^b$. The latter may have outlet orifices for the steam or gas and may form supports for the adjacent ends of the rollers, the other ends of which have stub axles $55^c$. One roller of each pair may be positively rotated by bevel gears $55^d$ from the shaft 21. After the retted flax has passed between one or more pairs of the drying rollers 55 it may be automatically reversed in its holder 30 by the appropriate positioning of a rack 41 to engage a pinion 39 of the holder as before referred, so that the semidried flax may be subsequently passed in the other direction between an additional pair or pairs of drying rollers to ensure that the flax is completely dried throughout its length.

The scutching or combing of the flax may be effected by one or more combs 48 movably mounted in suitable guides 51 beneath each pair of drying rollers 55. An additional comb or combs 48 may be disposed beneath the crushing rollers 3 as indicated in Figures 1, 2, and 9. The action of the combs is preferably arranged so that just before each sheaf 29 commences to move backwards between the respective pair of crushing rollers 3 or the drying rollers 55, the respective comb is moved forwardly into position, so that its teeth 49 pass through the material as the latter is drawn upwardly. To automatically move the combs into and out of operative positions one crushing roller 3 (or drying roller 55) of each pair may be provided with two strikers 52, 53, (Figure 9) adapted during the first revolution of the roller in each direction to engage a projection 54 on the comb and move the latter in the appropriate direction along its guide 51. The strikers may be pivoted and have stops 56 adapted to keep each striker rigid when it engages the projection 54 whilst the roller 3 (or 55) is moving in one direction but allows it to yield against a spring 57 when the striker and its roller 3 (or 55) are moving in the other direction.

In order to keep the comb teeth clean, a perforated plate 58 may be arranged adjacent and opposite each comb so that the teeth 49 thereof are passed through the perforations 59 before entering the material 29. Thus as the combs are withdrawn from the material they return through the perforated plates which effectively remove any sap, pith or other matter adhering to the teeth.

After the flax has been finally dried and combed it is carried upwardly by the conveyor to the delivery station where the rack 43 successively engages the pinion 39 of each flax holder, thus rotating the gripping rollers 31 and causing the treated material to be automatically discharged. Any suitable means may be provided at the delivery station for collecting the discharged material.

To ensure that the material 29 is effectively directed between the first pair of crushing rollers 3, I may provide co-acting directors (Figure 11) immediately above the first rollers. One of these directors may comprise a transversely extending plate 61 hinged or pivoted as at 62 and normally pressed by a spring 63 into the unbroken line position in Figure 11 and adapted to be engaged by the gripping roller carriers 34 as they approach the crushing rollers, and thus moved into an out of the way position as indicated in broken lines. The other director may consist of an opposed plate 64 which may be curved, if so

desired, and pivoted as at 66 so that it may be moved automatically by suitable operative connections into and out of position. Such directors will not be required for subsequent crushing rollers as after the first crushing action the material is sufficiently straightened out or stiffened.

If desired, the aforesaid combs 48 or some of them may be dispensed with and substituted by pairs of rotary scutchers 68 as seen in Figure 10. These rotary scutchers may have suitable blades 69 and be rotated at a suitable speed, preferably in one direction, by any suitable connections from the main source of power.

A collecting trough 71, fitted with a screw conveyor 72, may extend longitudinally of the machine beneath the crushing rollers, in order to collect and remove the falling straw or other matter for bagging or disposal.

The speed of rotation of the rollers 3, 50 and 55 is preferably synchronized with the rate of travel of the conveyor 24 so that as the suspended flax 29 passes downwardly between each pair of rollers the latter partially rotate in an appropriate direction which is then automatically reversed as beforementioned to carry the flax upwardly between the rollers as the conveyor 24 moves upwardly from the adjacent lower guide sprockets 28 and carries the flax therewith. For this purpose, the shaft 21 driving the various rollers may also be utilized to drive the conveyor 24 by the intermediary of a suitable arrangement of gearing 73 adapted to translate the automatic reversing drive of the shaft 21 into a continuous one way drive for the conveyor.

This gearing 73, which is shown in Figures 12 and 13, may include two driving wheels 76, 77, which may be mounted on an extension $4^a$ of the axle 4 of one of the positively driven crushing rollers 3. One wheel 76 meshes with a wheel 78 which is freely mounted on a driven shaft 79, whilst the wheel 77 meshes with an idle pinion 81 which in turn meshes with a second free wheel 82 on the shaft 79, which may be connected by belt, chain or any other suitable driving means with the driving sprockets 26 of the conveyor. The two free wheels 78, 82 are provided with pawls 83, 84, (which may be pivoted to arms 86, 87 on the free wheels) adapted to engage the teeth of a gear 88 fixed to the shaft 79 between said free wheels. The arrangement is such that according to the direction in which the positively driven rollers 3, 50 and 55 are being rotated, so will one or other of the pawls 83, 84, take up the drive and thus rotate the shaft 79 always in the same direction, and at a speed which is the same as the speed of the positively driven rollers. The gearing 73 is supported by a suitable frame 80.

Notwithstanding such an arrangement for providing a synchronized rate of speed of the rollers and the conveyor, the latter may through wear, stretching or other causes tend to lag slightly. To counteract any such lag in the travel of the conveyor, I may provide a compensating device including a disc 88 fixed onto the shaft 25 (see Figure 6) and provided with a series of circumferentially spaced teeth 89 adapted to be engaged by a gravity pawl 91 mounted on an arm 92 which is free to rotate on the shaft 25. A suitable predetermined to and fro movement may be imparted to the arm 92 by means of a connecting rod 93 extending to a rocker arm (not shown) which may be adapted to periodically engage a roller carried by the main driving wheel 11, whereby, in the event of the conveyor 24 lagging in relation to the rotation of the rollers 3, 50 and 55, the pawl 91 engages one of the teeth 89 on disc 88 and thus imparts an additional movement to the shaft 25 and the conveyor.

According to Figures 14 to 16, which illustrates a preferred form of flax holder, means are provided for reversing the position of the holders about their pivotal mountings 36 on the conveyor, whereby after the flax has been moved lengthwise through a pair of gripping rollers 31, as before mentioned, it still hangs centrally from between said rollers instead of passing around one of the rollers as seen in Figure 1. This arrangement positively ensures that the entire length of the flax will be subjected to the various treatments.

In accordance with this embodiment the aforesaid side lugs or extensions 44 and the associated curved nose 46 are dispensed with whilst each holder is provided with outstanding balancing arms 94, 95 extending at right angles to the gripping rollers 31 which may be mounted in detachable bearings $33^a$. The holders are pivotally mounted on the conveyor chains by means of pivot pins or bolts 36 which may pass through the links of the conveyor chains, as seen in Figure 15, and each pivot pin is slidably and rotatably accommodated within elongated slots 96 formed in the oppositely disposed end plates 97 of the holders. These end plates may be maintained in position by bars 98 secured to the end plates by screws or the like.

In this manner the arms 94, 95 tend to maintain the holders in either a normal or a reversed position on the chains according to the particular position of the pivot pins 36 which are free to move longitudinally to either end of the aforesaid slots 96. The arms are also adapted to slidably engage the various guide rails 47 for the purpose before mentioned.

In operation the conveyor carrying the flax holders, after passing diagonally upwards from a lower sprocket 28, may be passed around an intermediate guide

sprocket (not shown) so that the holders preferably approach the reversing rack 41 in a substantially vertical direction as seen in the left hand portion of Figure 16. When nearing the upper sprocket 27, one of the bars 98 of the flax holder engages a foot 99 of a leg 101 attached to the framework.

This arrangement causes the flax holder to swing about its pivot pins 36 whereby the slots 96 assume a substantially horizontal attitude so that when passing the sprocket wheel 27 the pivot pins are caused to move longitudinally to the opposite end of the slots 96. After the holder has passed the rack and the flax has been reversed as before mentioned, the new position of the pivot pins within their slots alters the balance of the holder and causes it to swing about the pivot pins and assume an attitude which is reversed to that in which it approached the rack, as indicated in the right hand portion of Figure 16. Thus the balancing arm 95 which depended from the holder when approaching the rack now upstands from the holder after passing around the next sprocket 27.

According to a modification, as seen in Figure 17, for actuating the combs in unison, each of the combs 48 is suitably connected to a sliding rod or rods 102 which may be located on opposite sides of the machine. Longitudinal reciprocation may be imparted to the rod or rods by means of a rocker arm 103 which may be actuated by suitable gearing 104 from the oscillating shaft $13^a$ of the wheel 13.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A method of treating flax which consists in attaching sheaves of flax to a conveyor at longitudinally spaced positions thereof, causing the conveyor to feed each sheaf successively to series of decorticating devices, retting devices and scutching devices, and varying the attitude of each sheaf on the conveyor after a portion of the sheaf has been acted upon by one or more devices of each series so that the other portion of the sheaf will be acted upon by the other device or devices of each of said series of devices.

2. In apparatus for treating flax, separate devices for operating on the flax, an endless conveyor, holders applied to said conveyor at longitudinally spaced positions to grip the flax, driving means and guiding means for said conveyor so arranged that it has a rearwardly moving upper portion and a forwardly moving lower portion, the guiding means for said lower portion comprising upper and lower sets of guide members, whereby the flax carried by said lower portion is caused to pass alternately downwards towards each separate device and upwardly therefrom.

3. In apparatus for treating flax, series of separate devices arranged in side by side formation for treating the flax, an endless conveyor extending longitudinally above said series of devices and having a rearwardly moving upper portion and a forwardly moving lower portion, holders applied to said conveyor at longitudinally spaced positions to grip the flax, and upper and lower sets of guide members for the lower portion of the conveyor, whereby the flax while suspended from said holders is caused to pass alternately downwards towards each device of each series and thence upwardly, for the purpose specified.

4. In apparatus for treating flax, series of separate devices for treating the flax, a conveyor extending longitudinally above said series of devices, holders pivoted to said conveyor at longitudinally spaced positions and adapted to grip sheaves of the flax at one end, upper and lower sets of guide members for said conveyor whereby each sheaf while suspended from said holders is caused to pass alternately downwards towards each device of each series and thence upwardly, and means adapted to automatically reverse the position of the holders after each sheaf has been acted upon by one or more of the devices of each series so that it may be subsequently acted upon from its previously gripped end by the other device or devices of each series.

5. In apparatus for treating flax, series of devices arranged in side by side formation for treating the flax, an endless conveyor extending longitudinally above said series of devices and having a rearwardly moving upper portion and a forwardly moving lower portion, holders applied to said conveyor at longitudinally spaced positions to grip sheaves of the flax at one end, upper and lower sets of guide members for the lower portion of the conveyor whereby the flax while suspended from said holders is caused to pass alternately downwards towards each device of each series and thence upwardly, means adapted to automatically reverse the position of each sheaf in its holder after the sheaf has been acted upon by one or more of the devices of each series so that it may be subsequently acted upon from its previously gripped end by the other device or devices of each series, and means for automatically releasing the completely treated flax from the holders after it has been acted upon by all of said devices.

6. In apparatus for treating flax, series of decorticating devices, retting devices and scutching devices arranged in side by side formation, an endless conveyor extending longitudinally above said series of devices, flax holders extending transversely on said conveyor at longitudinally spaced positions, driving and guiding means for said conveyor

whereby the flax is fed to each of said decorticating, retting and scutching devices in succession, and automatic means for freeing and discharging the flax from its holders after it has been acted upon by all of said devices.

7. In apparatus for treating flax, series of decorticating devices, retting devices, drying, and scutching devices arranged in side by side formation, a conveyor extending longitudinally above the said series of devices, holders on said conveyor at longitudinally spaced positions each adapted to grip a sheaf or strick of flax at one end, guiding means for said conveyor whereby each sheaf or strick is fed in succession to said series of decorticating, retting, drying and scutching devices, and means adapted to automatically reverse the positions of each sheaf in its holder after it has been acted upon by one or more of the devices of each series and to grip said sheaf at its opposite or treated end so that the sheaf may be further acted upon from its previously untreated end by the other device or devices of each series.

8. In apparatus for treating flax, decorticating, retting and drying devices, each of said devices embodying co-acting rollers, reversible driving means for said devices, a conveyor, holders at spaced positions on said conveyor for gripping flax, means for guiding the conveyor, and means for driving said conveyor in one direction whereby the flax is successively fed towards and passes first in one direction and then in the other between the rollers of each device of the said series.

9. In apparatus for treating flax, series of decorticating devices, retting devices, drying and scutching devices, each of said devices embodying two co-acting rollers, automatically reversible driving means for said devices, a conveyor, holders at spaced positions on said conveyor for gripping flax, means for guiding the conveyor, and means for driving said conveyor at a substantially constant speed in one direction whereby the flax is successively fed towards and passes first in one direction and then in the other between the rollers of each device of the said series.

10. In apparatus for treating flax, decorticating, retting, artificial drying and scutching devices, each including a roller, driving means for rotating each roller alternately in opposite directions, a conveyer, and means to convert the two way or reversing motion of said driving means into substantially constant one way motion of said conveyor, whereby the flax is fed forward and acted upon successively by said decorticating, retting, drying and scutching devices while the flax is being moved by said conveyor.

11. In apparatus for treating flax, decorticating, retting, artificial drying and scutching devices each including a roller, driving means adapted to rotate each roller alternately in opposite directions, a conveyor, means converting the two way or reversing motion of said driving means into substantially constant one way motion of said conveyor whereby the flax is fed forward and acted upon successively by said decorticating, retting, drying and scutching devices while the flax is being moved by said conveyor, and means adapted to automatically correct any lag in the rate of travel of said conveyor relative to the speed of rotation of said rollers.

12. In apparatus for treating flax, retting means comprising one or more tanks for containing a retting liquid, one or more pairs of rollers each extending across the top of a retting tank, means for rotating one roller of each pair alternately in opposite directions, a conveyor extending above said retting means, means for attaching flax to said conveyor and driving and guiding means for said conveyor whereby the flax is fed towards each pair of rollers and passes between them first into and then out of the retting liquid, the rollers subjecting the flax to squeezing, for the purpose specified.

13. In apparatus for treating flax, retting means comprising one or more tanks for containing a retting liquid, pairs of rollers each extending across the top of a retting tank, means for rotating one roller of each pair alternately in opposite directions, a conveyor extending above said retting means, means for attaching flax to said conveyor, whereby the flax is fed successively towards each pair of rollers and passes between them first into and then out of the retting liquid, the rollers subjecting the flax to squeezing, and means adapted to automatically vary the position of the flax on the conveyor after it has been acted on by one or more pairs of said rollers so that portions of the flax prevented from being treated by said rollers are brought into a position to be subsequently treated by the other pair or pairs of rollers.

14. In apparatus for treating flax, retting means comprising one or more tanks for containing a retting liquid, and one or more pairs of rollers extending across the top of a tank, drying means comprising one or more pairs of rollers having associated heating means, driving means for rotating one roller of each pair alternately in opposite directions, a conveyor extending above said retting and drying means, means for attaching flax to said conveyor, and driving and guiding means for conveyor whereby the flax is fed towards each pair of rollers located above the tank and passes between them first into and then out of the liquid, said rollers subjecting the retted flax to squeezing, and the flax is then caused to pass in each direction between said heated rollers.

15. In apparatus for treating flax, sepa-

rate devices for acting on the flax, a conveyor, flax holders on the conveyor, each holder including a pivoted carrier and a pair of gripping rollers between which a sheaf of flax may be gripped, and means located between any adjacent two of said devices for rotating said gripping rollers and for swinging said pivoted carrier into a reverse attitude, for the purpose specified.

16. In apparatus for treating flax, separate devices for acting on the flax, a conveyor, flax holders on the conveyor, each holder including a tiltable carrier and a pair of rollers between which a sheaf of flax may be gripped, pin and slot means for connecting each carrier to said conveyor so that the balance of the carrier is varied according to the longitudinal movement of each pin in its slot, and means located between any adjoining two of said devices for rotating said gripping rollers and for engaging said carrier to shift its point of balance so that it will swing into a reversed position, for the purpose specified.

17. A method of treating flax which consists in continuously and uninterruptedly conveying the flax from a point at which the flax is in a non-treated condition to a point at which the flax is in a finally treated condition, and subjecting the flax during this travel successively to decorticating, retting and scutching, the flax during this travel being subjected in part to each particular treatment and immediately thereafter subjected in the remaining part to the same treatment whereby the flax is wholly subjected to each treatment without interrupting the continuous travel of the flax from the point of non-treatment to the point of complete treatment.

18. A method of treating flax which consists in the uninterrupted and continuous travel of the flax in separate unit masses from a point of non-treatment to a point of complete treatment, subjecting each unit mass during its travel to decorticating, retting and scutching, each unit being initially subjected in part to a particular treatment and immediately thereafter subjected to a similar treatment in the remaining part whereby at the point of final treatment the entire mass of each unit has been completely subjected to each treatment without interrupting the continuous travel of the units.

In testimony whereof I affix my signature.

NORMAN CECIL GRIGG.