Aug. 24, 1937. P. SHAW 2,091,165

MACHINE FOR TREATING BAST FIBERS

Filed Nov. 29, 1935 3 Sheets-Sheet 1

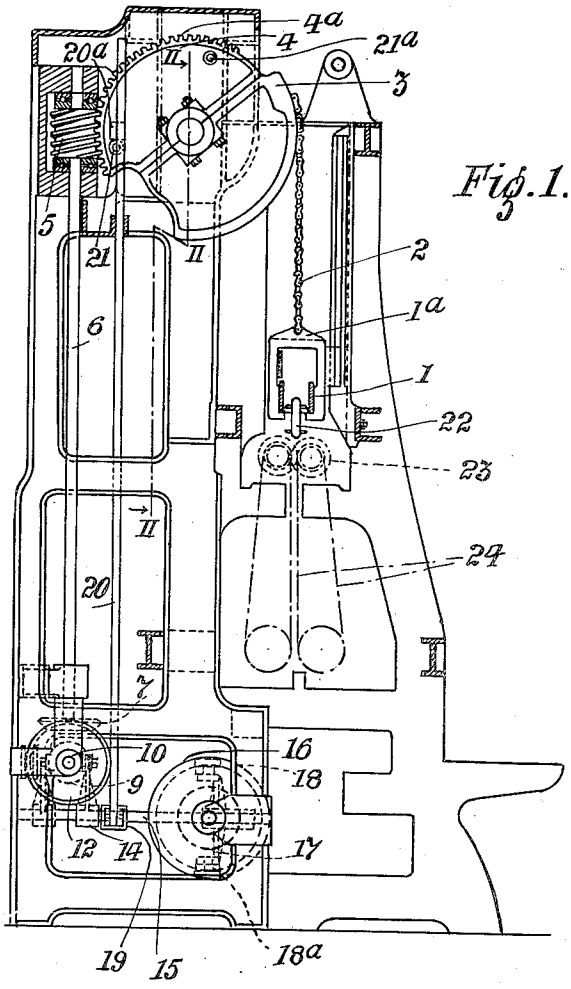


Fig. 1.

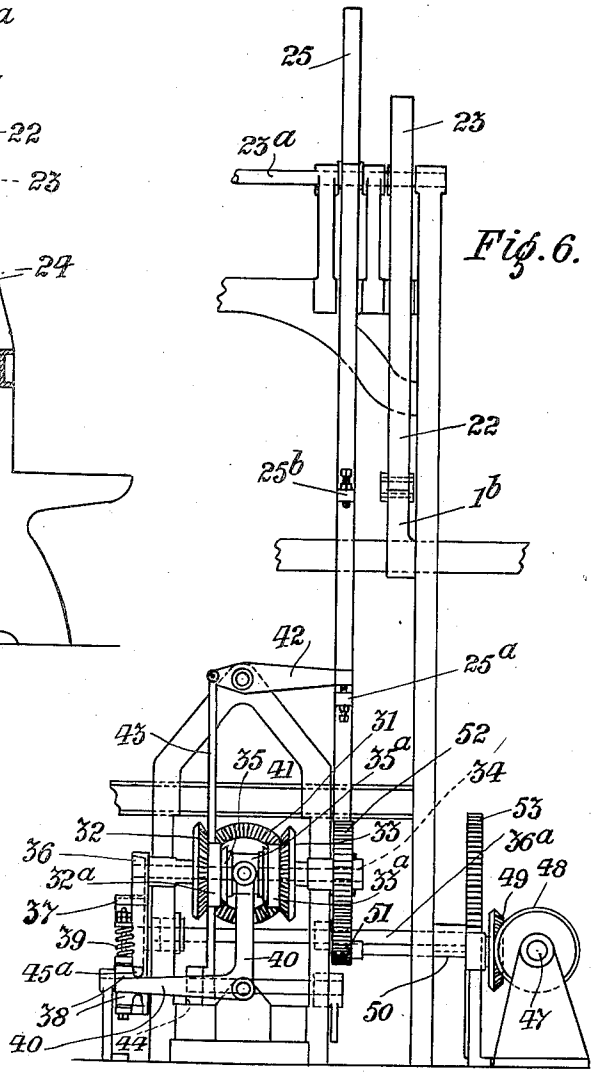


Fig. 6.

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Fig. 3.

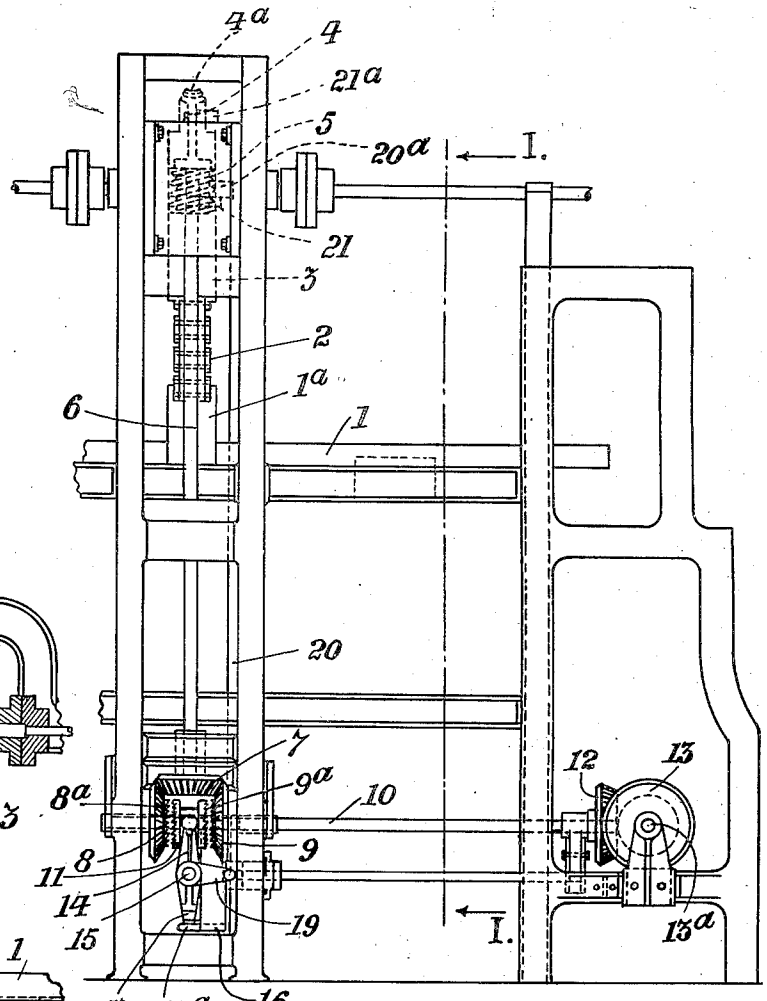
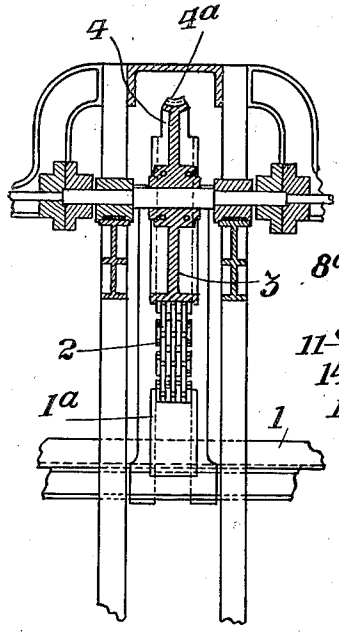


Fig. 2.



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Fig. 4.

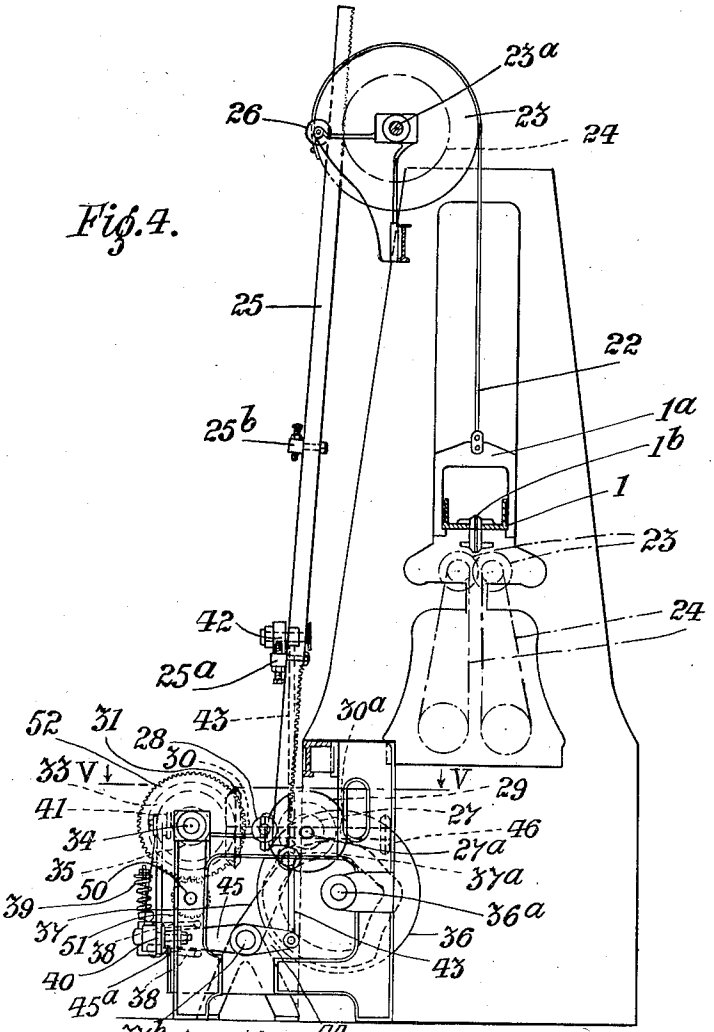
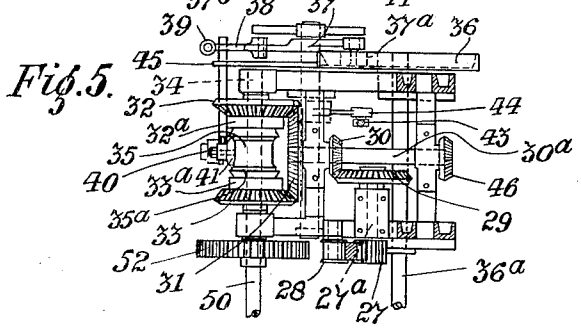


Fig. 5.



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Patented Aug. 24, 1937 2,091,165

UNITED STATES PATENT OFFICE

2,091,165

MACHINE FOR TREATING BAST FIBERS

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Application November 29, 1935, Serial No. 52,182
In Great Britain December 3, 1934

11 Claims. (Cl. 19—13)

This invention relates to machine for decorticating and/or hackling flax or other bast fibers and of the type in which flax pieces are clamped in holders and passed along horizontal channels with a falling and rising movement, to lower the flax to be acted on by revolving scutching rollers or equivalent, or by revolving sheets of hackle pins or equivalent; and to raise the flax out of the action of these rollers, sheets or equivalent means during the periods when the holders containing the flax are moved to new positions along the channels in well known ways. The invention relates more particularly to means for controlling the rise and fall of the horizontal channels and is designed to give greater rigidity against the action of scutching rollers or equivalent and/or hackling sheets or equivalent and to ensure more equable movement of the channels, when rising or falling, than hitherto.

At present the usual means for controlling the rise and fall of the channels in scutching and hackling machines, where rising and falling channels are used, comprises a timed cam with lever and runner, with connection from the lever to an upper lift shaft, on which are mounted lift pulleys with belt connections to the channels, suitable balance weights being provided to counter-balance the weight of the channel and holders. The mechanical disadvantage of a comparatively short cam movement controlling a comparatively long upward and downward movement of the channel results in a weak resistance against the pull of the scutching rollers or hackling sheets or equivalent on the pendant flax resulting in a jerky movement of the channel, increasingly apparent as the pull of the scutching rollers, hackling sheets, or equivalent increases.

I propose to overcome this defect by providing positively driven gearing with which is incorporated a suitably controlled reversing clutch gear for reversing the direction of movement of the upper lift shaft and channel, said gearing giving a positive resistance to the pull or drag of the scutching rollers, or hackling sheets, or the like, on the flax.

In carrying out the invention I may mount a suitable worm wheel segment on the upper lift shaft driven by a suitably mounted and controlled worm constrained to revolve alternatively in one direction and the other. To the shaft on which the worm is mounted a bevel wheel may be keyed and this may be driven alternatively by opposing bevel wheels on a cross shaft, due to a sliding clutch on the cross shaft being brought into engagement with clutch teeth on the bevel wheels alternatively. The manner of engagement and disengagement of the sliding clutch is an important part of my invention. The de-clutching is accomplished by suitable lever or other means controlled by the movement of the channel or of the worm wheel segment on the upper lift shaft. The re-clutching is by means of a timed cam and suitable lever or other means. This method of control is a necessity to stop the channel movement definitely at a fixed point in each movement, and to restart the movement of the channel at a fixed point in the cycle of operations. The connection to the channel from the upper lift shaft may be by means of a spur gear segment fixed to the shaft and a toothed rack gearing with the segment and attached to the channel; or by a chain quadrant fixed to the shaft and a chain attached to the quadrant and to the channel, or by other suitable means.

If it is desired, as is sometimes the case, to vary the relative speed of the ascent and descent of the channel, as for instance a quick lift and slow descent, or to vary the relative duration of the time during which the channel is at rest at the top and bottom of the lift for the movement of holders, these objects can be achieved by changing the proportions of the bevel wheels described, or their equivalent, and by making the timed cam, or equivalent, of a suitably corresponding shape.

This invention will now be described, by way of example only, with reference to the accompanying drawings wherein:—

Fig. 1 is a sectional elevation on the line I—I, Fig. 3, of a flax scutching and hackling machine having channel-lowering-and-raising gear in accordance with the invention.

Fig. 2 is a fragmentary sectional elevation on the line II—II, Fig. 1.

Fig. 3 is a corresponding side elevation of a portion of the machine.

Fig. 4 is an end elevation of a flax scutching or hackling machine having a modified form of channel-lowering-and-raising gear, in accordance with the invention.

Fig. 5 is a sectional plan view on the line V—V, Fig. 4.

Fig. 6 is a corresponding side elevation of a portion of the machine.

Referring to the drawings:—

In the example shown in Figs. 1 to 3, the channel 1 and channel arch 1^a are connected to one end of a lift chain 2 the other end of which

is connected to a lift chain segment 3. Rigidly connected to the lift chain segment 3 is a worm wheel segment 4 having teeth 4a formed thereon adapted to mesh with a worm 5 mounted on the top end of a vertical shaft 6. The lower end of the shaft 6 is provided with a bevel wheel 7 which engages bevel wheels 8 and 9 free to rotate on a spindle 10. The bevel wheels 8 and 9 are provided with dog clutch teeth 8a and 9a adapted to be engaged alternately by a similarly toothed clutch member 11 slidably keyed on the spindle 10. The spindle 10 is rotated by means of a bevel wheel 12 mounted thereon engaging a bevel wheel 13 mounted on the main driving shaft 13a of the machine. The clutch 11 is moved by means of levers 14 mounted on a horizontal shaft 15 which is oscillated by means of a face cam 16 through the medium of a two armed lever 17 mounted on the shaft 15. Rollers or followers 18 and 18a are provided on the lever 17, the rollers bearing on the face of the cam 16. Positive disengagement of the clutch 11 is accomplished by means of a lever 19 mounted on the shaft 15, the outer end of the lever 19 being connected to a vertical rod 20 having a projection 20a at its upper end adapted to be engaged by studs or projections 21 and 21a attached to the worm wheel segment 4.

The arrangement described is such that when the machine is in operation, the bevel wheel 13 rotates the bevel 12 thereby rotating the spindle 10. The spindle 10 rotates the clutch 11 slidably keyed thereon, the clutch 11 rotating either of the bevel wheels 8 or 9 according as to whether the channel 1 is rising or falling. For example, let it be supposed that it is driving the bevel gear 9. The bevel gear 9 rotates the bevel 7 on the lower end of the vertical shaft 6 thereby rotating the shaft 6 which in turn rotates the worm 5. The worm 5 rotates the worm wheel segment 4 and let it be supposed that the direction of rotation is such that the lift chain 2 is lowered thereby lowering the channel 1 so that flax contained in a holder 22 is lowered between scutching rollers 23 or between hackling sheets 24 shown by the dot and dash lines Fig. 1. When the channel 1 reaches the limit of its downward travel, the projection 21 on the worm wheel segment 4 engages the projection 20a on the vertical rod 20 and moves the rod upwards, thereby partially rotating the shaft 15 through the medium of the lever 19 and causing the levers 14 to bring the clutch 11 out of engagement with the clutch teeth 9a on the bevel 9. After a suitable period of dwell the cam 16 moves the lever 17 causing further rotation of the shaft 15, the levers 14 then bringing the clutch 11 into engagement with the teeth 8a on the bevel 8 thereby giving a reverse drive to the vertical shaft 6. The channel 1 is now raised and when it has almost reached the limit of its upward travel, the projection 21a on the worm wheel segment 4 engages the projection 20a on the vertical rod 20 and moves the latter downwards. The shaft 15 is now partially rotated in the reverse direction to that in which it was previously rotated thereby causing the levers 14 to move the clutch 11 out of engagement with the teeth 8a on the bevel 8. The cam 16 then moves the clutch 11 into engagement with the teeth 9a on the bevel gear 9 and the cycle of operations is repeated. The contour of the face of the cam 16 may be arranged to give any desired periods of drive and dwell.

In the example shown in Figs. 4 to 6, the channel 1 and channel arch 1a are connected to one end of a lift belt 22 the other end of which passes over and is attached to a lift pulley 23 mounted on a shaft 23a. Also mounted on the shaft 23a is a pinion 24 adapted to be engaged by one end of a rack 25, a roller or runner 26 being provided to keep the rack 25 in engagement with the pinion 24. The other end of the rack 25 engages a pinion 27 mounted on one end of a shaft 27a, a runner 28 being provided to keep the rack 25 in engagement with the pinion 27. Mounted on the other end of the shaft 27a is a bevel gear 29 engaging a bevel gear 30 mounted on a shaft 30a on one end of which is mounted another bevel gear 31. The bevel 31 engages bevel gears 32 and 33 loosely mounted on a shaft 34, the bevel gears 32 and 33 being each provided with the female portions 32a and 33a of a cone friction clutch. Slidably keyed on the shaft 34 is a double ended male portion 35 of a cone friction clutch. The clutch portion 35 is moved alternately into engagement with the female clutch portions 32a and 33a by means of a track cam 36 mounted on a shaft 36a and acting through a bell crank lever 37 provided with a runner or follower 37a and jaw levers 38 controlled by means of a spring 39 the bell crank lever being loosely mounted on a shaft 37b. The jaw levers 38 grip the end of one arm of a bell crank lever 40, the other end of which carries a roller or runner 41 adapted to engage a groove 35a in the slidable clutch portion 35. The movement given to the bell crank lever 37 by the contour of the cam 36 is more than sufficient for moving the male portion 35 of the clutch into engagement with either of the female portions 32a and 33a, so that the spring 39 is compressed and exerts a suitable driving pressure on the clutch, the jaw levers 38 being pivotally mounted on the bell crank 37 permitting of the compression of the spring 39. Positive disengagement of the clutch is accomplished by providing adjustable stops 25a and 25b on the rack 25, said stops being adapted to engage and move one end of a lever 42 the other end of which is pivotally connected to one end of a rod 43. The other end of the rod 43 is pivotally connected to a lever 44 rigidly mounted on the shaft 37b. Also mounted on the shaft 37b is a lever 45 having a jaw 45a which grips the horizontal arm of the bell crank lever 40. A bevel gear 46 may be provided on the shaft 30a, said bevel gear being used to drive any portion of the machine required to be synchronized with the ascent and descent of the channel 1. The clutch shaft 34 is driven from the main driving shaft 47 of the machine by a bevel gear 48 mounted on the shaft 47, the bevel 48 engaging a bevel 49 mounted on one end of a shaft 50. Mounted on the other end of the shaft 50 is a pinion 51 engaging a spur wheel 52 mounted on the shaft 34. The shaft 36a, on which the cam 36 is mounted, is driven from a timed wheel 53 mounted on the shaft 36a, the wheel 53 being in the usual machine gearing.

In the arrangement just described let it be supposed that the sliding clutch portion 35 is in engagement with the female clutch portion 32a on the bevel gear 32 and let it be supposed that the direction of rotation is such that the bevel 32 rotates the bevels 31, 30 and 29 in a direction such that the pinion 27 moves the rack 25 upwards. The rack 25 rotates the pinion 24 mounted on the shaft 23a thereby rotating the lift pulley 23 and lowering the channel 1 so that

flax contained in a holder 1b is lowered between scutching rollers 23 or between hackling sheet 24 shown by dot and dash lines Fig. 4. When the channel 1 almost reaches the limit of its downward travel, the stop 25a on the rack 25 comes into engagement with one end of the lever 42 and moves it upwards. The other end of the lever 42 is depressed thereby moving the rod 43 downwards, the rod 43 partially rotating the shaft 37b through the medium of the lever 44. The jaw 45a on the end of the lever 45 is thereby moved upwards bringing with it the end of the horizontal arm of the bell crank lever 40, the spring 39 allowing this movement. The other arm of the bell crank 40 moves the slidable clutch portion 35 out of engagement with the female clutch portion 32a thereby stopping the drive to the rack 25. After a suitable pause, the cam 36 moves the bell crank lever 37 and jaw levers 38 mounted thereon thereby bringing the clutch portion 35 into engagement with the female clutch portion 33a thereby rotating the pinion 27 in the reverse direction and lowering the rack 25 which raises the channel 1. When the channel has almost reached the limit of its upward travel the stop 25b on the rack 25 comes into engagement with the end of the lever 42 depressing it and raising the other end. This movement acting through the rod 43 and levers 44 and 45 disengages the clutch portion 35 from the female portion 33a thereby stopping the upward movement of the channel 1. After a suitable pause the cam 36 brings the clutch portion 35 into engagement with the female portion 32a and the cycle of operations is repeated.

Although I have described my invention with reference to preferred constructions it will be understood that equivalent means may be used. The essential nature of my invention is the provision of reversible positively driven gearing to control the upward and downward movements of the channel, coupled with the stoppage of the channel's movement by its own action, and the re-starting of the movement by suitably timed cam means.

I claim:—

1. In a machine for treating bast plants including rising and falling holders for the plants and a raising and lowering pulley for the holders; lowering and raising means connected to said holders comprising a driving shaft, a forward and reverse gear, clutch means for putting one or other gear into operation, and a worm and wheel for driving the pulley, means on said pulley for disengaging said clutch means at predetermined points in the movement of the holders, and timed means for thereafter re-engaging said clutch means.

2. In a machine for treating bast plants including rising and falling holders for the plants and a raising and lowering pulley for the holders; lowering and raising means connected to said holders comprising a driving shaft, a forward and reverse gear and a worm and worm wheel at said pulley, clutch means for putting one or other gear into operation, projection means on said pulley knock-off means operable by said projection means to disengage said clutch means at predetermined points in the movement of the holders, and timed cam means for thereafter operating said clutch means to connect the other gear.

3. In a machine for treating bast plants including rising and falling holders for the plants and a raising and lowering pulley for the holders; lowering and raising means flexibly connected to said holders comprising a driving shaft, a forward and reverse gear, a double clutch member adapted to engage one or other of said gears, projection means on said pulley, knock-off means adapted to be operated by said projection means to disengage said clutch member at predetermined holder positions, and timed cam means for thereafter engaging the clutch member so that the other gear controls the movement of the holders.

4. In a machine for treating bast fibers including rising and falling holders for the plants; lowering and raising means flexibly connected to the holders comprising a lowering and raising pulley, rack and pinion means for driving same, a forward and a reverse gear for driving said rack, clutch means for putting one or other of said gears into action, means for disengaging said clutch means when the holders reach predetermined points and timed means for thereafter engaging the clutch means to bring the other gear into action.

5. In a machine for treating bast fibers including rising and falling holders for the plants and a driving shaft; lowering and raising means for the holders comprising a lowering and raising pulley, a flexible connection between same and the holders, rack and pinion means for driving the pulley, a forward and a reverse gear for driving said rack from said driving shaft, clutch means for putting one or other of said gears into action, spaced projection means on the rack, knock-off means adapted to be operated by said projection means when the holders reach predetermined positions and disengage said clutch means, and timed means for thereafter engaging the clutch means to bring the other gear into action.

6. In a machine for treating bast fibers including rising and falling holders for the plants; positively driven lowering and raising means flexibly connected to the holders comprising a lowering and raising pulley, rack and pinion means for driving same, a forward and a reverse gear for driving said rack, a double clutch member for putting one or other of said gears into action, a clutch-operating member, spaced projection means on the rack, knock-off means adapted to be operated by said projection means when the holders reach predetermined positions and operate said clutch-operating member, cam means for thereafter operating the clutch-operating member to put the other gear into action and a spring-controlled lost motion device associated with said clutch-operating member.

7. In a flax-treating machine comprising a rising and falling channel for the flax holders, a lowering and raising pulley therefor and a power drive; power transmission means for driving said pulley from said drive, comprising a gearing including a worm wheel drive at said pulley and forward and reverse gears, a double clutch element, spaced means on said pulley for disengaging said clutch means when the channel reaches predetermined positions and timed cam means driven from said drive for thereafter re-engaging the clutch means to put the other gear into action.

8. In a flax-treating machine comprising a rising and falling channel for the flax holders, a lowering and raising pulley therefor and a power drive; power transmission means for driving said pulley from said drive, comprising a reduction gearing including a rack and pinion drive for said pulley and forward and reverse gears, a double

clutch element, spaced means on said rack for disengaging said clutch means when the channel reaches predetermined positions and timed cam means driven from said drive for thereafter re-engaging the clutch means to put the other gear into action.

9. In a machine for treating bast plants including rising and falling holders for the plants; lowering and raising means flexibly connected to said holders comprising a driving shaft, a forward and reverse gear, a double clutch member adapted to engage one or other of said gears, projection means on said lowering and raising means, knock-off means adapted to be operated by said projection means to disengage said clutch member and timed cam means for thereafter causing engagement of the clutch member with the other gear so that said gear controls the movement of the holder.

10. In a machine for treating bast plants including rising and falling holders for the plants; lowering and raising means flexibly connected to said holders comprising a driving shaft, a forward and reverse gear, a double clutch member adapted to engage one or other of said gears, contact means on said lowering and raising means, knock-off means adapted to be operated by said contact means to disengage said clutch member and timed cam means for thereafter causing engagement of the clutch member with the other gear so that said gear controls the movement of the holder.

11. In a machine for treating bast plants including rising and falling holders for the plants; lowering and raising means flexibly connected to said holders comprising a driving shaft, a forward and reverse gear, a double clutch member adapted to engage one or other of said gears, projection means driven alternately by said gears in opposite directions, knock-off means adapted to be operated by said projection means to disengage said clutch member and timed cam means for thereafter causing engagement of the clutch member with the other gear so that said gear controls the movement of the holder.

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