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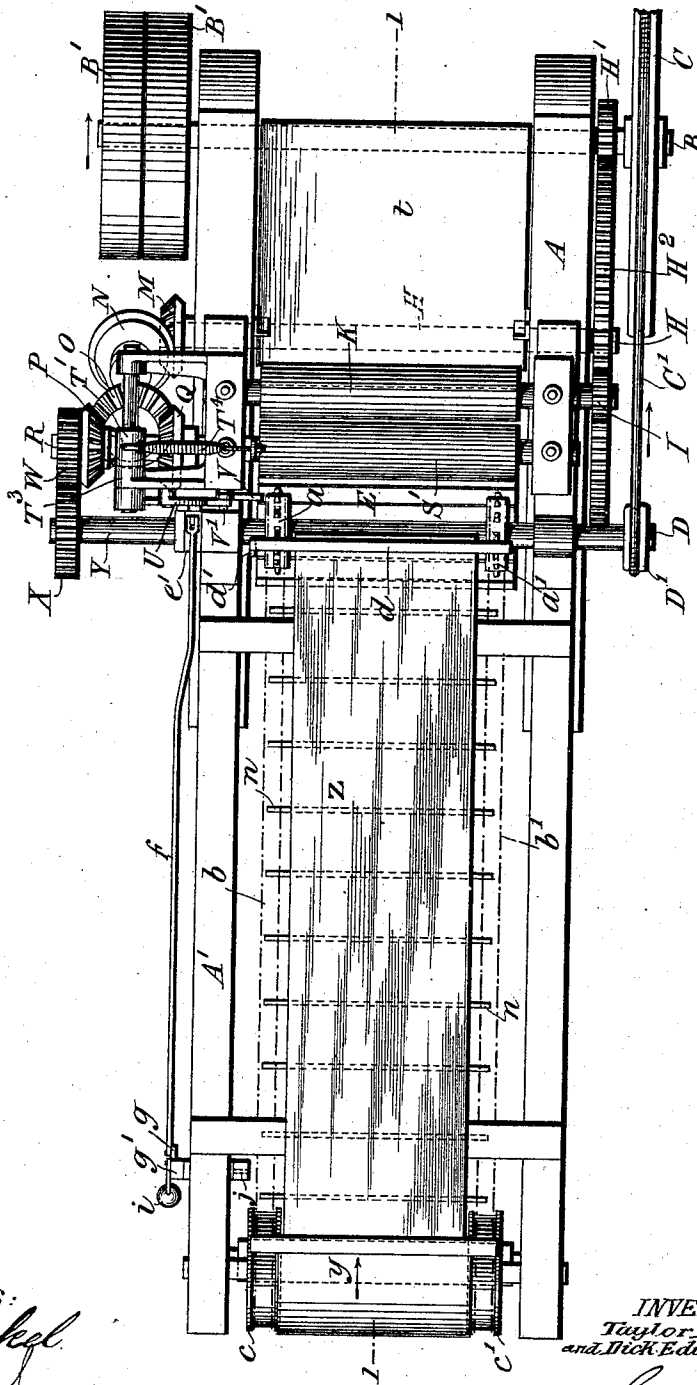
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T. BURROWS & D. E. RADCLYFFE.
MACHINE FOR DECORTICATING FIBROUS PLANTS.

No. 580,635.

Patented Apr. 13, 1897.

Fig. 1.



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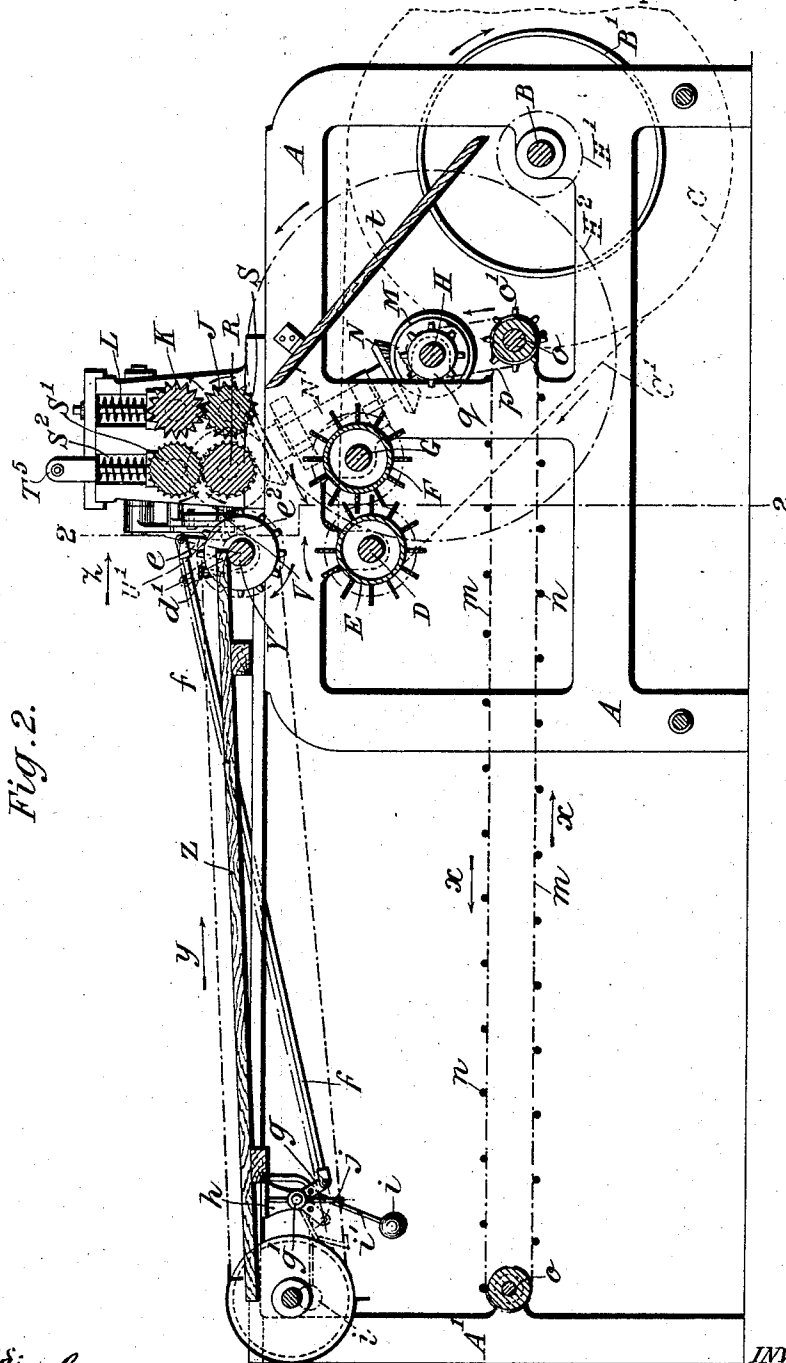
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(No Model.)

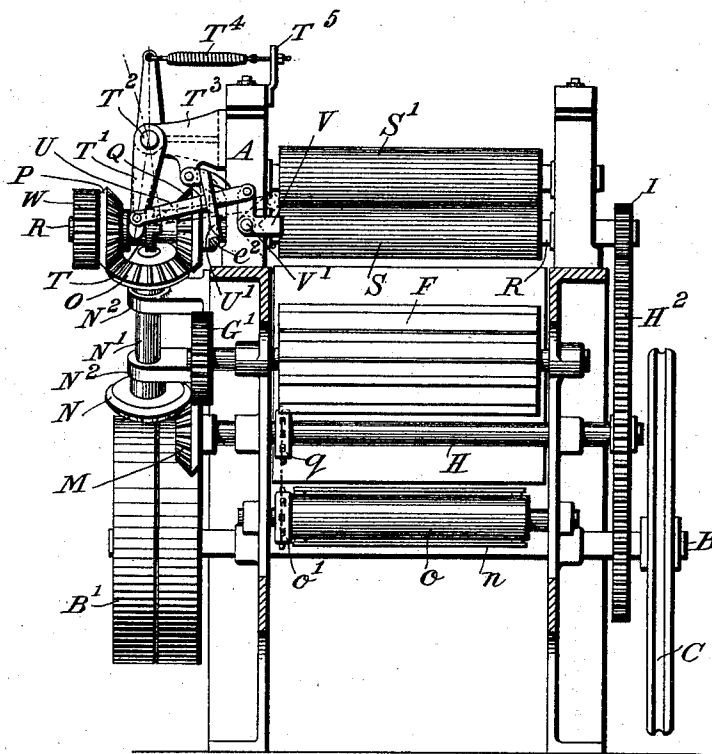
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Fig. 3.



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UNITED STATES PATENT OFFICE.

TAYLOR BURROWS AND DICK EDWARDS RADCLYFFE, OF LONDON,
ENGLAND.

MACHINE FOR DECORTICATING FIBROUS PLANTS.

SPECIFICATION forming part of Letters Patent No. 580,635, dated April 13, 1897.

Application filed December 3, 1895. Serial No. 570,909. (No model.)

To all whom it may concern:

Be it known that we, TAYLOR BURROWS, engineer, of 88 Upper Kennington Lane, and DICK EDWARDS RADCLYFFE, gentleman, of 56 Gloucester Crescent, Regent's Park, London, England, subjects of the Queen of Great Britain, have invented a Machine for Decorticating Fibrous Plants, of which the following is a specification.

This invention relates to a machine or apparatus to both break or decorticate and scutch fibrous plants, stems, or straws, such as ramie, (known also as "china-grass" or "rhea,") hemp, jute, &c., at both ends thereof—that is, throughout their length at one operation—viz., by passing same once through this machine—the present invention being specially designed and adapted for separating the fiber or fibrous parts from the boon or woody part and pellicule (or the greater part thereof) of ramie or the like plants, stems, or straws, especially while in the green state, so as to get such fiber into the condition known in England as "china-grass" or the "filasse" of china-grass, although, of course, this machine may be used for treating any other fibrous plants, stems, and straws for which same may be applicable or adapted.

In order that our present invention may be easily understood and readily carried into practice, we will proceed to fully describe same with reference to the drawings hereunto annexed.

Figure 1 is a plan of the machine. Fig. 2 is a longitudinal vertical sectional view on line 1 1, Fig. 1. Fig. 3 is an end view on line 2 2, Fig. 2, looking in the direction of the arrow z.

Similar letters of reference indicate corresponding parts throughout.

A is the main frame of the machine, and A' an extension or part thereof supporting the feed-table.

B' B' are fast and loose pulleys on the main driving-shaft B of the machine and driven by a driving-belt from any suitable source of power.

C is a pulley or grooved wheel keyed or otherwise rigidly fixed on the said shaft B.

C' is a driving band or belt from the large pulley C to the small pulley D' on the shaft D, journaled in said frame A.

E F are a pair of very quickly revolving beating-rollers, the blades or beaters of which intersect with one another, but never touch, one such set of blades or beaters E being carried on the said shaft D and very quickly revolved by the said small pulley D'. On the end of the shaft D opposite to the pulley D' is a toothed wheel D², (see dotted lines in Fig. 2,) which gears with a toothed wheel G' (see Fig. 3) on the shaft G, carrying the blades or beaters F, whereby the latter are correspondingly revolved with the bladed roller E. Thus the bladed rollers E and F are revolved at a very high rate of speed.

H' is a small toothed wheel fixed also on the main shaft B and which gears with the large toothed wheel H², fixed on the axle or shaft H, whereby a comparatively slow motion is imparted to said shaft H.

I is a very small pinion or toothed wheel which gears with said large toothed wheel H², said toothed wheel I being fixed onto or to the shaft or axle of the roller J, having blades thereon or flutes or furrows therein pressed into those on the corresponding roller K by means of the springs L acting on its bearings so as to force said roller K normally against said roller J, whereby the former is caused to revolve with the latter at the same rate of speed.

M is a bevel-toothed wheel on the slowly-revolving shaft H, which meshes with and thereby revolves the bevel cog-wheel N, fixed on the shaft N', on the other end of which latter is the bevel cog-wheel O, said shaft N' being journaled in brackets N², fixed to the main frame A. The said bevel-toothed wheel O gears with the two bevel cog-wheels P Q, which latter are thereby continuously revolved (in opposite directions to each other) freely on the shaft or axle R of the roller S of the pair of feed and crushing rollers S S', the latter of which, S', by means of the strong springs S² (see Fig. 2) acting on the bearings thereof, is firmly pressed against the driven roller S and thereby revolved therewith.

It is evident without detailed illustration that skilled mechanics may couple rollers J K and S S' together for proper rotation by adopting several well-known mechanisms without departing from the scope or spirit of

our invention, and we do not therefore limit ourselves to the exact means shown.

T is the clutch-piece of the well-known type, sliding on a feather on the shaft R, by which the latter is revolved backward or forward when the said clutch-piece T is thrown into gear with one or other of the bevel-wheels P or Q, as hereinafter explained.

T' is a forked lever pivoted at T² to a bracket T³, fixed to the frame A of the machine, the upper end of said pivoted lever T' being controlled by a spring T⁴, fixed to another bracket T⁵ on said frame A. The lower end of said lever T' is forked and embraces the said clutch-piece T, by which the latter is moved longitudinally along the shaft R, as hereinafter explained. U is a connecting-rod pivoted at one end to the said lower or forked end of the pivoted lever T', while at its other end this rod U is pivoted to the bell-crank V, which latter is pivoted at V' to the main frame A. Thus when the free end of said bell-crank V is forced downward, as hereinafter explained, the clutch-piece T is thereby drawn out of engagement with the bevel cog-wheel P and forced (against the action of the spring T⁴) into engagement with the bevel cog-wheel Q, and thereby the direction of rotation of the roller S is reversed.

W is a toothed wheel (loose on the shaft R) fixed to or forming part of the bevel-wheel P, whereby said toothed wheel W is constantly revolved in the same direction as the bevel-wheel P, the said toothed wheel W gearing with a toothed wheel X, (see Fig. 1,) the latter being fixed on the shaft Y, by which means the feeding motion is imparted and the mechanism for reversing the rollers S S' actuated, as hereinafter explained.

Z is the feed-table, in the case illustrated formed by a board or plank fixed to the frame A'.

a a' are sprocket-wheels fixed on the shaft Y at opposite sides of the fixed feed-table Z. b b' are endless chains driven by said sprocket-wheels a a' at one end and passing around idle-pulleys or loose rollers c c' at the other end. D is a cross-rod or L-shaped bar, or same may be U-shaped or any other suitable form or shape, advantageously of metal and fixed to or carried on said two endless chains b b' or equivalent endless ropes, apron-band, &c., so that said cross-rod d will be continuously carried round and round by these two driving-chains b b' in the direction shown by the arrows g in Figs. 1 and 2 and pass over and along said table Z and then descend at the end thereof next the aforesaid rollers S S' and pass back underneath said table Z and come up at the opposite end thereof and pass over the top of said table Z again, and so on. One end of this cross-bar d (which we will term the "pusher-bar") is prolonged at d', or may have mounted thereon any suitable projection or device, or a suitable separate projection or cross-bar or other device in addition to the said cross-bar d can be sepa-

ately mounted on the said endless traveling chains or equivalent, adapted to engage the finger or arm of the aforesaid bell-crank V, whereby the latter is forced into the position shown in dotted lines in Fig. 3, and thus the clutch-piece T is drawn out of connection with the bevel-wheel P and put in connection with the bevel-wheel Q, whereupon the direction of rotation of the shaft R and roller S thereon is reversed.

e is a lever mounted by a collar e' on the shaft Y, said collar e' having studs or projections e² thereon which engage with a finger U', connected to the aforesaid lever U, whereby the latter is raised and the clutch-piece T moved out of the bevel-wheel Q into gear again with the bevel-wheel P when the said lever e is pulled over in the opposite direction to the arrow z, as hereinafter explained.

f is a long connecting-rod pivoted at one end to the lever e and at the other end to a lever-arm g, which latter at its other end is pivoted at g' to a bracket or other suitable support on the frame A'. i is a weight or counterbalance fixed rigidly by the arm i' to the said short lever g. j is another arm or lever fixed rigidly to the same pin or axis g' as that on which the said short lever-arm g is fixed, this arm or lever j being interposed in the path of travel of the said projection d'.

m is an endless band with battens or ribs n thereon carried on the rollers o and caused to travel continuously in the direction of the arrows x by the chain p passing round the sprocket-wheel o', fixed to the roller o, and the sprocket-wheel q, fixed on the constantly-revolving axle H, whereby motion is thus imparted to said endless traveling band m, upon which the fiber drops or is delivered from the pair of beaters E F and thereby delivered at the end A' of the machine convenient for removal.

t is a board or shield at the other end of the machine—i. e., behind the rollers J K—upon which the woody part or other matter removed from the fibrous material drops.

The operation is as follows: While the aforesaid pusher-bar d is beneath the stationary table, the fibrous sticks, stems, or straws are laid on said table Z, where same rest until said pusher-bar d comes up (round the pulleys c c') behind them and pushes same along the top of the table Z, so as to feed them in between the crushing-rolls S S'. The latter now seize and crush said sticks, stems, or straws, the peripheral speed of the crushing-rolls S S' being about the same as the speed of travel of the said endless chains b b' and pusher-bar d thereon, and while still holding them firmly present same to the action of the aforesaid more quickly revolving scutching or beating devices or rollers J K until just as or just before the back ends—i. e., advantageously the root ends—of said stems, &c., pass in between said crushing-rolls S S'. The end d' of the pusher-bar d now strikes the

finger or arm of the bell-crank lever V, and thereby causes the reversal of the direction of rotation of said crushing-rolls S S', or this reversal may be effected in any other suitable manner, as desired, whereupon the stems, &c., are now drawn back by said crushing-rolls S S' against the action of the said scutching-rolls J K, and the back ends of said stems, &c., fall or are led or are forced downward by the pusher-bar *d* or otherwise and pass in between the aforesaid second set of very quickly revolving scutching or beating devices or rollers E F, where that part of the back end of the stems, &c., which had not passed in between the rollers J K is now subjected to a scutching or beating action between E and F, while the remainder of the length of these stems, &c., which had already been subjected to one action between the rollers J K, is now subjected to a second scutching or beating action while still held between the crushing-rolls S S' until they pass clear of the latter, whereupon the cleaned fiber drops from between the said rollers or devices E F either onto the traveling delivery-belt *m*, as aforesaid, or the fibers may be delivered or removed in any other suitable manner. Meantime the pusher-bar *d* has been traveling along beneath the table Z, and after the fibers have been delivered clear of the rollers S S' the end or projection *d'* on said pusher-bar *d* now arrives and strikes against the lever *j*, Figs. 1 and 2, whereby the lever-arm *g* and weight or counterbalance *i*, fixed thereon, are thrown into the position shown in dotted lines in Fig. 2, and thus by means of the connecting-rod *f* the lever *e* is pulled over into the position shown in dotted lines in Fig. 2, the stud or projection *e*² strikes the finger U' and thereby returns the bell-crank lever V and connecting-rod U into their original position, (shown in full lines in Fig. 3,) and thus the clutch-piece T is thrown out of connection with the bevel-wheel Q and into connection again with the bevel-wheel P, whereby the shaft R, with the roller S thereon, is again driven forward in the direction shown by the small arrows in Fig. 2. The pusher-bar *d* now comes round the pulleys *c c'* again and feeds in the next lot of sticks, straws, or stems laid on said table Z, when the operation is repeated, and so on, the reversal of the direction of the rollers S S' being thus automatically effected.

Instead of the stationary feed-table, as aforesaid, an endless traveling sheet or feed-apron or equivalent may be used either on an incline or horizontal, if desired, having a pusher-bar, as before, carried round thereby or therewith, and also means to actuate the reversing mechanism of the crushing-rolls S S', as aforesaid.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a machine for breaking or decorticat-

ing and scutching fibrous plants, stems, or straws, such as ramie or the like, the combination of a pair of feed crushing-rollers, means for revolving said rollers in either direction, means for reversing the direction of rotation of said rollers without stopping the machine, a pair of scutching, decorticating or beating rollers behind said crushing-rollers, means for constantly and more quickly revolving the scutching-rollers in one direction only, and a second pair of beating-rollers or devices arranged below said crushing-rollers, substantially as set forth.

2. In a machine for breaking or decorticating and scutching fibrous plants, stems or straws, such as ramie or the like, the combination of a pair of feed crushing-rollers, means for revolving said rollers in either direction, means for reversing the direction of rotation of said rollers without stopping the machine, a pair of scutching, decorticating or beating rollers behind said crushing-rollers, means for constantly and more quickly revolving the scutching-rollers in one direction only, a second pair of beating-rollers or devices arranged below said scutching-rollers, the fiber-feeding device, and means actuated by the fiber-feeding device to cause the alternate reversal of the feed crushing-rollers, substantially as set forth.

3. A machine for breaking or decorticating and scutching fibrous plants, stems or straws, such as ramie or the like, the combination of two pairs of constantly-revolving scutching, decorticating or beating rollers, means for revolving one pair of said rollers in the opposite direction to the other pair, with a pair of crushing-rollers arranged between the said two pairs of beating-rollers, means for slowly revolving said crushing-rollers first in one direction and then in the other, and means for conveying away the treated fiber, substantially as set forth.

4. In a machine for breaking or decorticating and scutching fibrous plants, stems or straws, such as ramie or the like, the combination of two pairs of beating-rollers, and means for revolving each pair in one direction but in the opposite direction to the other pair, with a pair of crushing-rollers arranged between the pairs of beating-rollers, means for revolving said crushing-rollers in either direction, means for reversing the crushing-rollers without stopping the machine, a lever connected to said reversing means, and the fiber-feeding device provided with a finger or projection adapted to strike a portion of the reversing means or mechanism at two points in the path of travel of said projection, substantially as set forth.

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