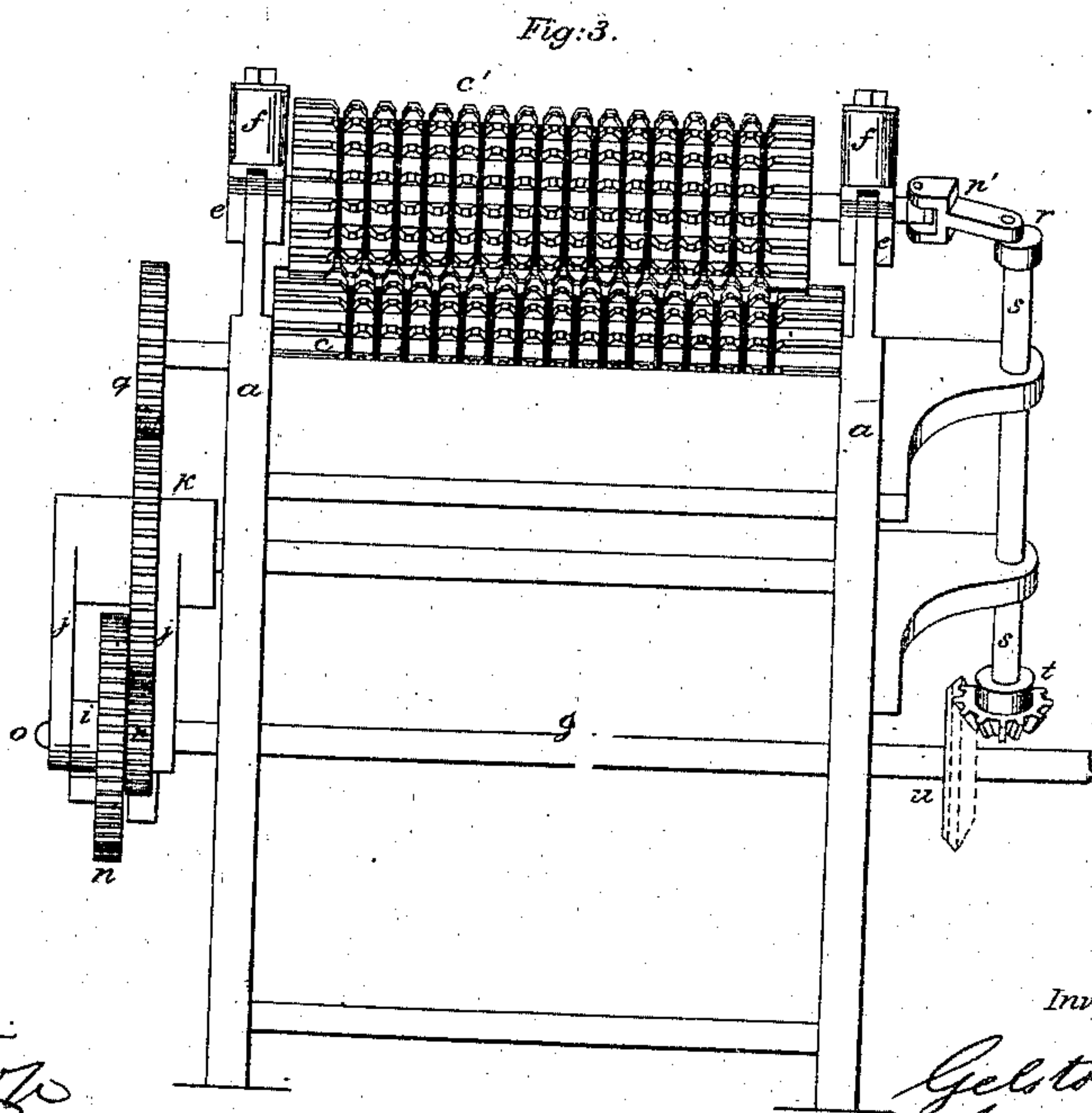
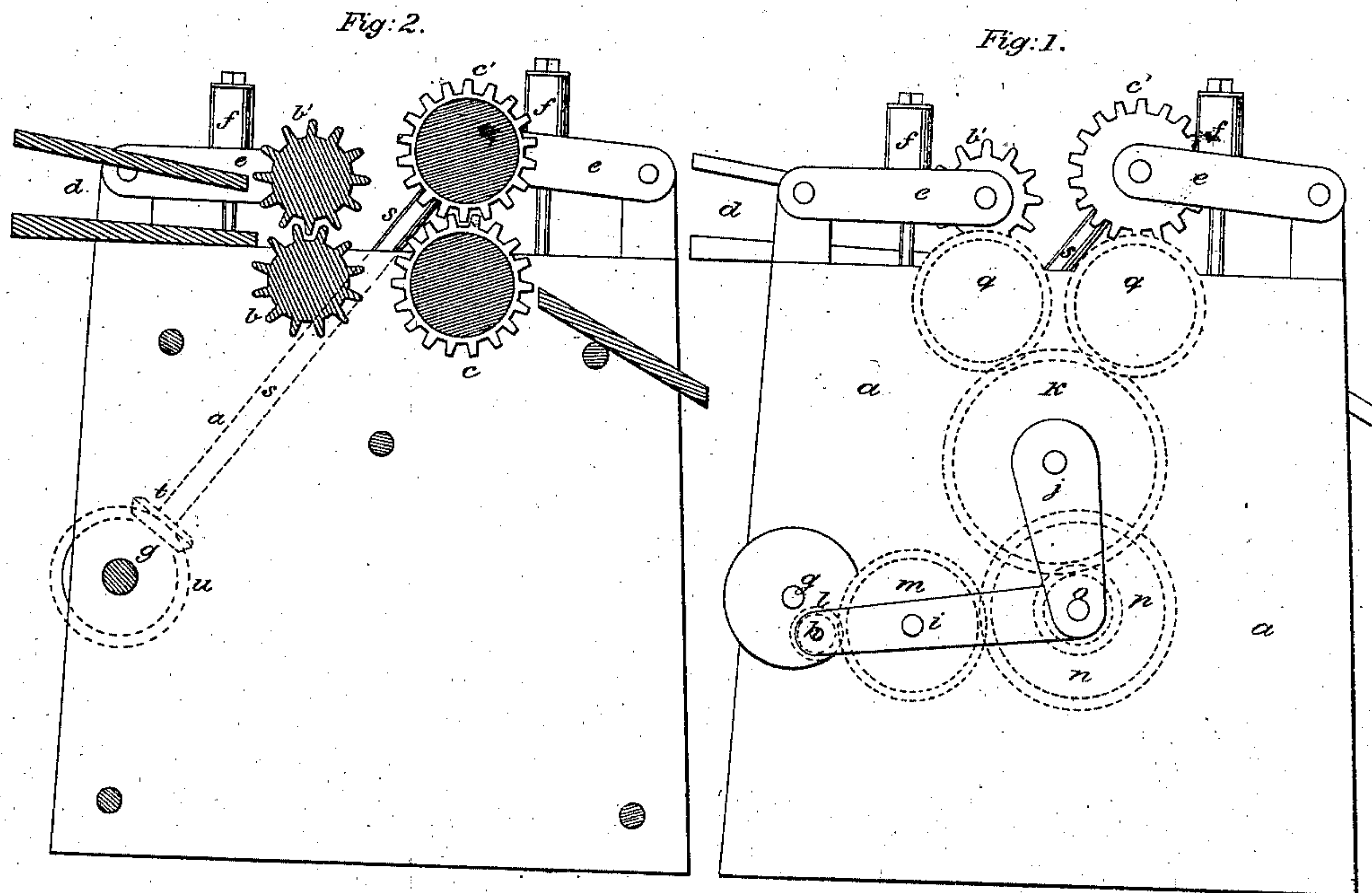


G. SANFORD & J. E. MALLORY.
MACHINE FOR BREAKING AND CLEANING FLAX, &c.
No. 39,680. Patented Aug. 25, 1863.



Witnesses:
A. Kelley
W. H. Minkoff

Inventors:
Gelston Sanford
Jas E. Mallory

UNITED STATES PATENT OFFICE.

GELSTON SANFORD AND JAS. E. MALLORY, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR BREAKING AND CLEANING FLAX, &c.

Specification forming part of Letters Patent No. 39,680, dated August 25, 1863.

To all whom it may concern:

Be it known that we, GELSTON SANFORD, a subject of the Queen of Great Britain, now temporarily residing in the city of New York, and JAMES E. MALLORY, of the city, county, and State of New York, have invented certain new and useful Improvements in Machinery for Breaking and Cleaning Flax, Hemp, and other like Fiber-Yielding Plants; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side elevation; Fig. 2, a longitudinal vertical section, and Fig. 3 an elevation of the rear end.

The same letters indicate like parts in each of the figures.

Our said invention relates to improvements on the machine for this purpose secured to us by Letters Patent bearing date the 16th day of September, 1862. In the said machine secured to us by the said Letters Patent the fluted rollers, whether one or more pairs, have a reciprocating rotary motion, the range of which is greater from the feeding-in table than toward it, so as to act on the stalks and fibers alternately in opposite directions and cause them gradually to travel through the machine. Subsequently to the grant of the said Letters Patent other Letters Patent were granted to us, bearing date the 28th day of April, 1863, for an improved mechanism for imparting the required reciprocating rotary motion to the said rollers in a more perfect and efficient manner, which improved mechanism we prefer to use in connection with our present improvements, and have represented the same in the accompanying drawings, although the required motions may be imparted by other means.

In the accompanying drawings, *a* represents the frame, and *b b'* a pair of fluted, and *c c'* a pair of toothed, rollers, the pair *b b'* being placed next to the feeding-in table *d*, where the flax or other fibrous substance is properly spread to be presented to their bite, and the other pair, *c c'*, is placed a short distance back of them. The journals of the two lower rollers, *b* and *c*, are mounted in suitable boxes in the frame, and the journals of the upper rollers, *b'* and *c'*, are mounted in boxes fitted in hinged

arms *e e e e*, borne down by springs *f f f f*, to cause the said upper rollers to make pressure on the flax or other substance which may be passing between them and the lower rollers. The driving-shaft *g* carries a crank-pin, *h*, which is connected by a joint-link, *i*, with the lower end of a pair of arms, *j j*, which are thus vibrated back and forth by the revolution of the crank. On the axis of vibration of the said vibrating or swinging arms *j j* there is mounted a cog-wheel, *k*, which is free to turn independently of the said arms. The crank-pin *h* carries a cogged pinion, *l*, and the cogs of this pinion engage the cogs of a wheel, *m*, mounted so as to turn on a stud projecting from the inner face of the joint-link *i*, and the said cog-wheel *m* engages another cog-wheel, *n*, which is free to turn on the link-pin *o*, which connects the joint-link *i* with the vibrating arms *j j*; and the last-named cog-wheel carries a concentric pinion, *p*, which turns with it, and this pinion engages the cog-wheel *k*, before described, the said cog-wheel *k* in turn engaging a cog-wheel, *q*, on the shaft of each of the lower rollers, *b* and *c*.

By the connections above described the required motions are imparted to the lower rollers without shock or violence. The periphery of the rollers *c c'* should travel a little faster than the periphery of the rollers *b b'*, so that both pairs of rollers shall have a rubbing or combing action on the fibers, and in the direction of the length of the fibers, which action will tend to loosen and separate from the fibers the woody and other foreign substances. We prefer to obtain this difference of motion by making the pair of rollers *c c'* of greater diameter than the rollers *b b'*; but it will be obvious that the same result can be attained by equivalent means, such as making the two cogged wheels, *q q*, on the shafts of the lower rollers, *b* and *c*, of different diameters. The rear pair of rollers are grooved longitudinally and in the direction of the circumference, as represented, so that their surfaces, instead of flutes, present rings of teeth. These circumferential grooves are made deeper than the longitudinal ones, and we prefer not to extend them entirely to the ends of the rollers, thus leaving the longitudinal flutes at each end to answer as cogs, that the upper roller may be rotated by the lower one. I

desired, however, the circumferential grooves may extend to the ends of the rollers, the shafts of both rollers in that event being provided with suitable cog-wheels. The upper one of this pair of rollers should be shorter than the lower one, and its journals adapted to slide endwise in their boxes. One of the journals of the roller *c'* extends sufficiently outside of the frame to be connected by a universal joint with one end of a joint-link, *p'*, the other end of which is in turn connected with a short crank, *r*, on the upper end of an inclined shaft, *s*, which receives motion from the driving-shaft by two beveled cog-wheels, *t* and *u*. The throw of the crank *r* should be short to impart to the upper roller, as it vibrates on its axis, a short longitudinal reciprocating motion.

By reason of forming the surface of the rollers with rings of projecting teeth and imparting to them the two sets of motions above described, the woody portion of the flax or other plant is broken by the teeth of each roller bending and forcing it into the spaces between the teeth of the other, a slight rubbing action in the direction of the length of the fibers being produced by alternately reversing the rotary motion, while at the same time, by the sliding of one of the rollers on the other, an efficient rubbing action is produced across the fibers, which, more efficiently than any other known means, loosens and separates the particles of woody and other foreign substances from the fibers; and by making the circumferential grooves deeper than the longitudinal ones, the fibers, as they are separated from the foreign substances, will enter and lie in the bottom thereof, to be out of the way while the teeth continue to act on the fibers which have not yet been thoroughly cleaned, and by making the periphery of the second pair of rollers travel faster than the periphery of the first pair, as before stated, a species of combing action takes place not only to rub and loosen, but also to comb the fragments out of the mass of fibers; and although we prefer to use two pairs of rollers, the first pair fluted—that is, grooved longitudinally—and the second pair formed with the teeth by the cross-grooves, and the circumferential grooves deeper than

the longitudinal grooves, and to cause the periphery of the second pair of rollers to travel faster than the first pair, yet we do not wish to be understood as limiting ourselves to the use of all these improvements in connection, as the use of any one of them will materially improve the operation of a machine; and although we prefer to give the longitudinal reciprocating motion to the upper roller, *c'*, it will be obvious that the same result would be produced by giving such motion to the lower instead of the upper roller, or by causing both to vibrate longitudinally but in opposite directions; and although the best results will be obtained from this longitudinal vibration of the rollers when their peripheries are formed with teeth instead of flutes, nevertheless a good result can be obtained from such vibratory motion when the rollers are only fluted.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. Making the peripheries of the second pair of rollers travel faster than the first pair when both pairs of rollers have a reciprocating rotary motion on their axes, substantially as and for the purpose set forth.

2. Imparting to one or both of the rollers of a pair a longitudinal reciprocating motion, substantially as described, in combination with a reciprocating rotary motion, substantially such as described, and for the purpose set forth.

3. The combination of a pair of toothed rollers having a reciprocating rotary motion, and a longitudinal reciprocating motion, substantially as described, with a pair of fluted rollers having a reciprocating rotary motion, substantially as described.

4. Making the circumferential grooves of the pair of toothed rollers of greater depth than the longitudinal grooves, substantially as and for the purpose specified.

GELSTON SANFORD
JAS. E. MALLORY

Witnesses:

THOMAS D. STETSON,
WM. H. BISHOP.