

CLASS III., *Sub-Class A.*—GUSTAV ALBRECHT CARL BREMME, of Liverpool, England.—(Dated 27th January, 1870.)

THIS invention relates to new and improved apparatus for causing the continuous rotary movement for breaking and softening flax in one direction of a shaft or prime mover to communicate to other parts of the mechanism a reciprocating rotary movement greater in the one direction than in the other, and such improved apparatus is especially applicable.

A toothed wheel is fixed on the reciprocating shaft of the roller, and a pinion is held in gear with this wheel by means of radii or arms connecting the axis of the wheel with the axis of the pinion, allowing both to rotate freely, but keeping their axis always at the proper distance for gearing. The axis of the pinion or any point of arms is connected by a connecting-rod to a crank or eccentric fixed on a continuously rotating shaft or prime mover, so that as this prime mover rotates the pinion is caused to vibrate in an arc described from the centre of the reciprocating shaft. On the reciprocating shaft is mounted loosely a pulley or wheel, which is driven with continuous rotary motion by a band, strap, or by suitable gearing from any convenient prime mover. This pulley or wheel has affixed to it a toothed-wheel or pinion which gears into the vibrating pinion or into a wheel affixed to it; thus, while the pinion is caused to vibrate in an arc to and fro, it is also caused to rotate on its axis in one direction, and it imparts to the reciprocating shaft the reciprocating rotary movement required, namely, a movement alternately in the one direction and in the other, but greater in the one direction than in the other.

Instead of using a vibrating pinion gearing into a toothed-wheel on the reciprocating shaft, a worm may be employed, and a worm-wheel is in that case fixed on the reciprocating shaft; also, the worm itself or the pinion may be driven by worm-gearing or bevil-gearing, as may be readily understood. In cases where it is desired to have a small difference between the opposite movements of the reciprocating shaft, such worm-gearing is to be preferred.

Instead of driving the vibrating pinion from a wheel or pulley mounted on the reciprocating shaft, it is sometimes driven from the shaft or prime mover of the crank or eccentric by means of a crank-motion, in the following manner:—The pinion, which is held in gear with the reciprocating wheel by means of radii or arms as already described, has affixed to it a crank-arm of equal length with that of the crank which gives the vibrating movement to the pinion, or when an eccentric is used for this purpose the radius of the crank fixed on the pinion is equal to the radius or eccentricity of the eccentric; thus there are two equal cranks, one on the pinion and one on the prime mover, the latter of which may be an eccentric of equal radius. The crank-pin of the prime mover crank or the strap of its eccentric is connected by a rod, as already described, with the axis of the prime mover, so as to be always held at a definite distance from it; thus, when the prime mover rotates, it not only gives a vibrating movement to the pinion, but also causes it to turn on its axis in one direction. As in the action of this apparatus there are two dead points, two pairs of shear links are applied to the two connecting-rods for the purpose of bringing the pinion over those dead points. Each pair of these shear links consists of two rods, by preference of equal length, jointed together at one end, and jointed at their other ends to the two connecting-rods respectively; they are so placed that when the cranks are on one of the dead points the links of the one pair are folded up so as to stand perpendicularly to the connecting-rods, while those of the other pair are extended so as to form an angle with one another, and *vice versa*: the rotation of the prime mover crank with its rod past its dead points thus communicates, through the perpendicular links, a motion to the other rod, which carries the pinion past its dead points, the other or unfolded links allowing freedom for the movement. To prevent the links from turning past the position at which they are perpendicular to the rods, projections are formed on one side of each of them, and these projections bearing one against each of the rods on opposite sides act as stops to prevent either of the links from turning in the one direction from the perpendicular, while they leave them free to turn in the other direction, in obedience to the unfolding movement imparted to them by the cranks and rods.

Sometimes, instead of driving the reciprocating shaft of the roller, it is preferable to drive the periphery of the roller directly from the vibrating pinion. For this purpose the end of the roller may be geared either inwards or outwards, as may be found most convenient, with the pinion, the roller or its periphery being mounted loosely on its shaft. By this arrangement the pinion has only to overcome the inertia or momentum of the outer moving part of the roller.

After the fibre has been produced by the ordinary machines at present in use, this machine appears to be calculated to effect a considerable improvement by softening the fibre.

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CLASS III., *Sub-Class A.*—JOHN ELIOT HODGKIN, of Liverpool, England.—(Dated 21st January, 1870.)

THIS invention relates, first, to improvements in machinery for breaking, scutching, softening, washing, discharging, and separating the fibres of fibrous materials, (such as flax, hemp, China grass, or other fibrous materials), from the boon, flesh, or woody matter, adhering thereto, in order to prepare the same ready for the subsequent processes of bleaching, carding, combing, and spinning.

A series of three or more rollers are arranged around the circumference of a drum or cylinder of larger diameter; no particular number of such rollers is named. The rollers, and the drum or cylinder, thus arranged to work together, may be either plain, serrated, or have corrugated teeth formed thereon as may be found most suitable for the treatment of different kinds of fibrous materials; rotary motion is communicated to the drum or cylinder by suitable gearing, alternately in opposite directions, the movement in one direction or forwards being greater than the backward movement.

The mechanism for imparting alternate rotary motion to the drum or cylinder consists of toothed sectors acting upon toothed wheels, fixed on each end of the drum or cylinder, the toothed sector for imparting the forward movement being a larger number of teeth than the toothed sector which causes the drum to rotate in the opposite direction. The drum or cylinder communicates motion to the roller or rollers arranged around its circumference, either by surface contact or by suitable gearing. The