M. L. BARBEAU AND F. S. WEBER.

MECHANICAL MOVEMENT.

APPLICATION FILED AUG. 6, 1918.

1,420,360.

Patented June 20, 1922.

3 SHEETS—SHEET 1.

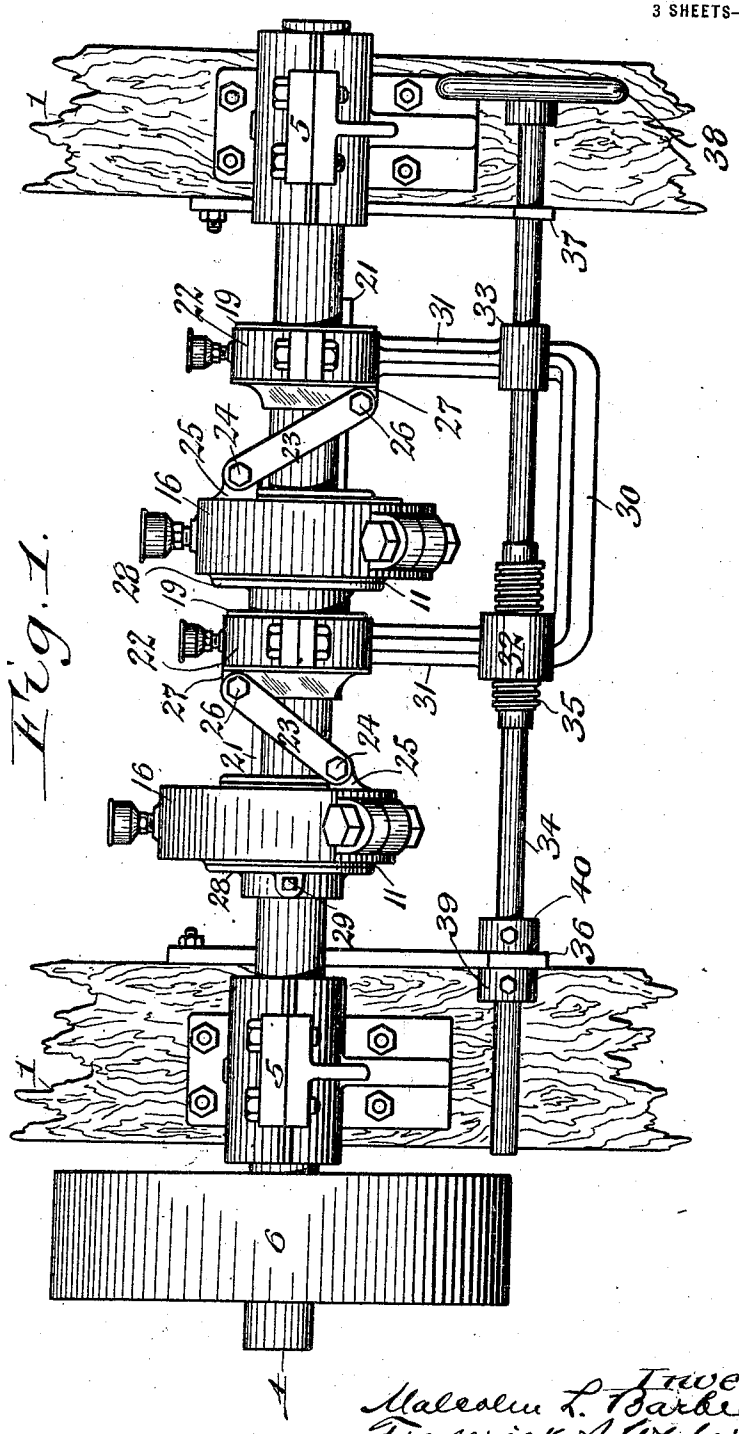



Fig. 1.

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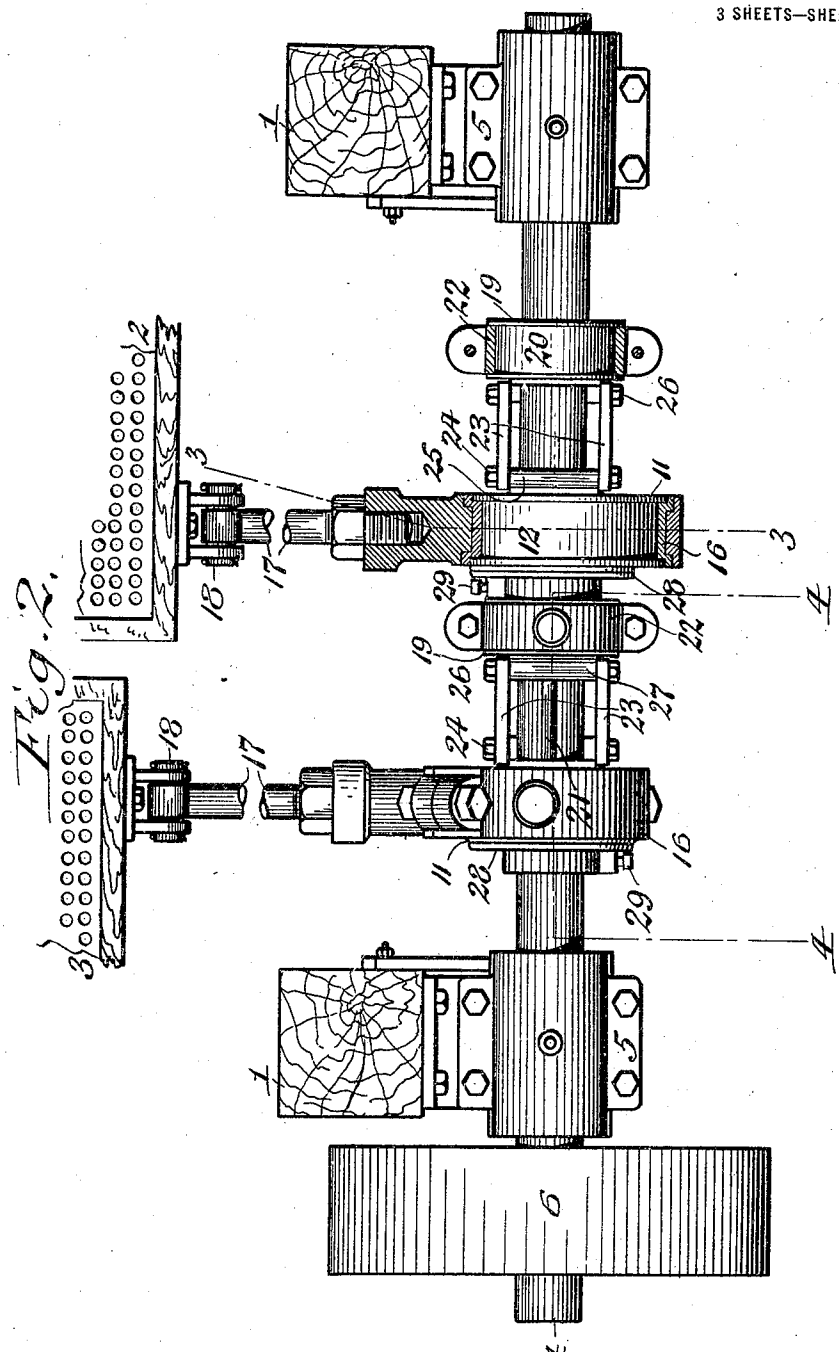


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

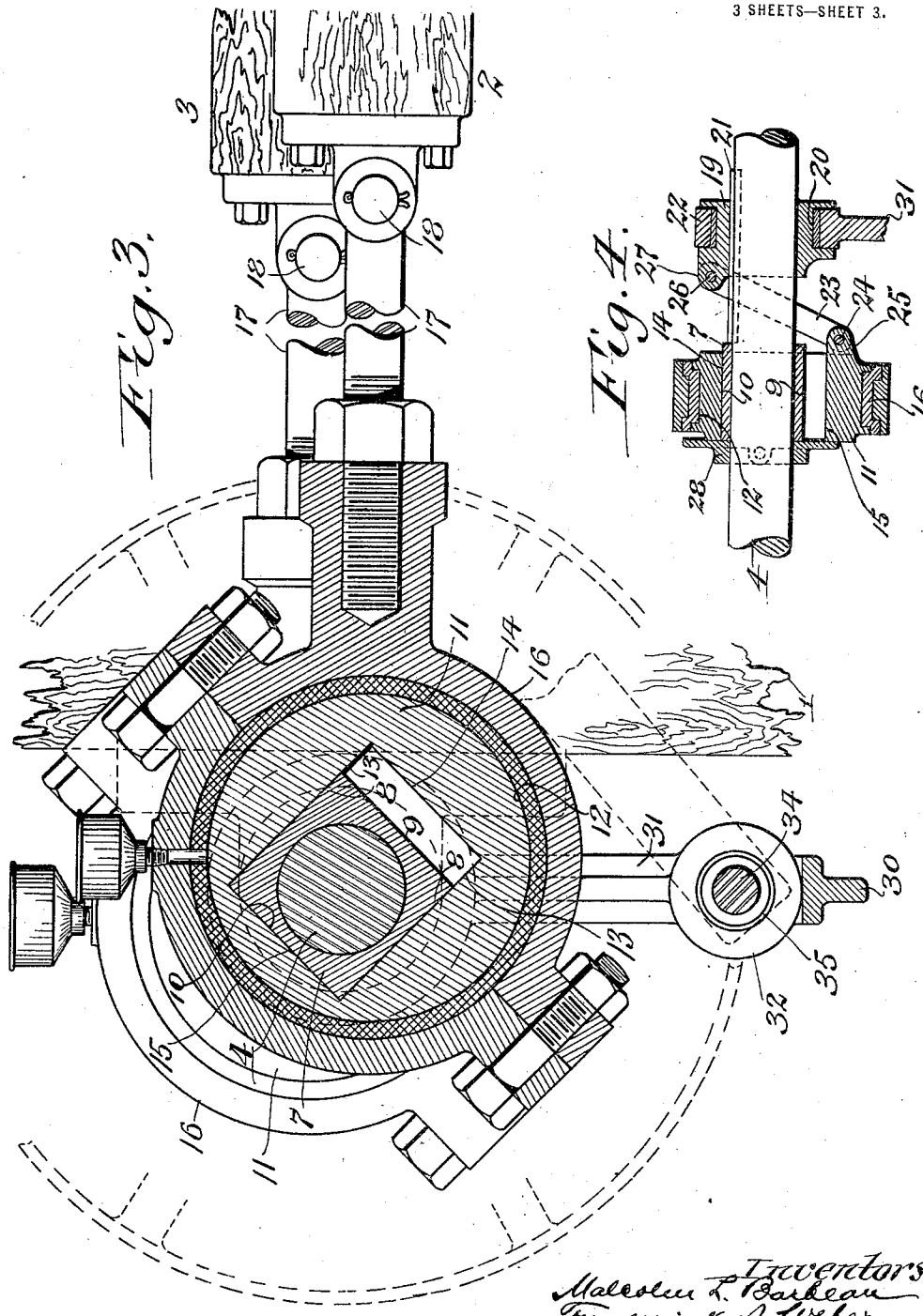



Fig. 4.




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# UNITED STATES PATENT OFFICE.

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## MECHANICAL MOVEMENT.

1,420,360. Specification of Letters Patent. Patented June 20, 1922.

Application filed August 6, 1918. Serial No. 248,629.

*To all whom it may concern:*

Be it known that we, MALCOLM L. BARBEAU and FREDERICK S. WEBER, citizens of the United States, residing in Silver Creek, in the county of Chautauqua and State of New York, have invented new and useful Improvements in Mechanical Movements, of which the following is a specification.

This invention relates to a mechanical movement in which provision is made for adjusting the stroke or throw of an eccentric which actuates another movable element. Although this mechanism may be used for a large variety of purposes in which an eccentric movement is employed the same has been designed more particularly for operating the sieves or screens of separating or cleaning machines, and in the following description reference will be made more particularly to such an organization for illustrating one of the various uses to which this improved mechanical movement may be put.

In separating, classifying or grading cereals, grains, seeds and other matter of a granular or pulverized nature, it has been customary in building machines for this work to provide one or more sieves which were inclined more or less and receive a reciprocating motion. The length of this reciprocation was governed by the character of the material intended to be treated in the machine inasmuch as an efficient separation of the particular kind of material necessitated a specific throw or length of stroke in the reciprocating motion imparted to the sieves. Those grains or seeds which have a rough outer coating or adhering husk, as well as those which are of irregular shape, like cracked corn, travel downwardly over an inclined sieve at a comparatively slow rate. Therefore to secure greater capacity in the machine, and more perfect or closer separation, it is necessary to impart a more violent motion to the sieve which is accomplished by employing an eccentric the throw or stroke of which is comparatively long. On the other hand, there are certain cereals, grains and seeds, such for instance as beans, field peas, lentils, vetch, mustard, hemp, rape and turnip seeds which are more or less round in shape and whose outside covering or shell is smooth, glassy or polished. The last mentioned seeds or materials require only a small eccentric movement which will produce a comparatively short stroke of the separating sieves for treating the materials passing over the same.

In actual practice, manufacturers of machines for cleaning grain, seeds and the like have been obliged to construct and furnish to the trade, machines in which the travel of the eccentric was adapted for treating particular grains, seeds and other material which necessitated keeping on hand eccentric operating devices having different throws and also required the mill to install an unnecessarily large number of machines in which the eccentric motion varied to suit the different materials which were to be treated, and this necessarily involved considerable expense as well as taking up unnecessary room. The necessity for providing some means for standardizing the eccentric operating mechanism and render the same adjustable so that the throw of the same might be varied to suit different requirements, will be apparent when it is understood that in grading broken rice grains, in separating paddy from rice, in extracting oats from groats, in cleaning flax seed, in separating stones from seeds, and for taking garlic out of wheat, a reciprocating movement is imparted to the sieves which at times is as much as nine inches in length. When separating or grading round, smooth seeds, chilled shot and similar substances, a comparatively small eccentric travel will suffice for reciprocating the sieves and obtaining an efficient separation, it being sufficient in some instances when the throw of the eccentric is as small as a quarter of an inch and imparts a corresponding length of throw to the sieve.

To meet these different requirements, mill owners have heretofore been obliged to install extensive batteries of cleaning and separating machines at considerable expense, so that some of the machines could be employed for handling wheat, others beans, some for certain kinds of vegetable seeds and still others for certain varieties of grass seeds, and so on. In this connection it should be understood that the lines are so closely drawn by seed men that a separator designed for cleaning clover seed would not be used for handling blue grass seed because it is unsuitable for that purpose, and one which would successfully clean timothy seed is almost of no value when operating on alfalfa seed.

It will therefore be apparent from the foregoing that the proposition of cleaning and separating grain, seeds and the like, which are different in character require different throws of the eccentric operating mechanism in order to properly treat these materials, inasmuch as each kind or variety of materials must be handled according to its individual characteristics. Even different batches of the same variety of seed or material sometimes vary in their nature, that is to say, some will be dry and others will be damp, and therefore require different lengths in the stroke of the shaking screen which operate on such materials.

It is also known that winter wheat moves more slowly than spring wheat, and this necessitates a longer stroke of the separating screen when operating upon winter wheat than when operating upon spring wheat, which latter is a smaller berry. It is also well known that if the mill operator were to employ his regular wheat cleaning machines for cleaning barley that its capacity would be reduced about one half, and that if it were attempted to clean oats or corn on a regular wheat cleaning machine, that the output of the same would be about two-thirds of the capacity as compared with the normal output when running wheat.

It is the object of this invention to provide a mechanical movement in which provision is made for adjusting the throw or stroke of the eccentric from zero up to the maximum limit for which the particular mechanism is designed and to so organize this mechanism that the same can be quickly, accurately and easily adjusted both while the machine is running or while it is standing still; which is readily applicable for operating either a single screen or similar part to be actuated or a plurality of screens arranged either side by side or one above the other, and moved alternately in opposite directions for avoiding unbalancing of the machine, and which is capable of being produced at low cost and of standard dimensions so that the same mechanism is applicable to various machines intended for a large variety of purposes.

In the accompanying drawings:

Figure 1 is a side elevation of our improved mechanical movement organized more particularly for reciprocating separating screens or shoes. Figure 2 is a top plan view of the same, partly in section. Figure 3 is a fragmentary vertical section, on an enlarged scale, taken on line 3—3, Fig. 2, but showing the parts in slightly different position. Figure 4 is a fragmentary, longitudinal section taken on line 4—4, Fig. 2.

Similar characters of reference refer to like parts throughout the several views.

Although this mechanical movement is applicable to a large variety of machines, in which a reciprocating, oscillating or shaking part is to be actuated, the same is illustrated in the present instance in connection with a separating machine which comprises a main frame 1 and two horizontally-reciprocating or shaking screens or shoes 2, 3, arranged side by side and adapted to be moved alternately in opposite directions for balancing the movement of these parts. Our improved mechanical movement whereby the stroke or throw of these screens may be adjusted to suit the requirements of the material under treatment is constructed as follows:

4 represents a horizontal driving shaft which is journaled in bearings 5, 5 on the main frame so as to extend crosswise of the direction of movement of the screen, this shaft being operated either by a belt passing around a pulley 6 on one end thereof, as shown in Figs. 1 and 2, or by any other suitable means.

Mounted on this shaft are two eccentric operating mechanisms which are identical in construction, and each being designed to operate one of the screens, so that the following description of one will therefore apply to both of these eccentric mechanisms:

7 represents a guide or driving block arranged on the driving shaft and either secured thereto as shown in Figs. 3 and 4, or formed integrally therewith. This guide block is preferably, though not necessarily, square in cross section and provided on opposite sides of the axis of the shaft with two guide faces 8, 8 which are arranged parallel with a radial line of the shaft and also with two stop faces 9, 10 arranged on opposite sides of the axis of the shaft at right angles to said guide faces. 11 represents an eccentric disk which is provided in its periphery with an annular groove 12 while its central part is provided with a diametrical slot forming two guide faces 13, 13 which are arranged on opposite sides of the axis of this disk and parallel with a radial line of the same, and two stop faces 14, 15 arranged at right angles to the guide faces 13 and on opposite sides of the axis of this disk. The guide faces of the eccentric disk engage with the guide faces of the guide block 7 and the stop faces of the disk are adapted to engage with the stop faces of this block upon sliding the disk radially relatively to the shaft. Upon sliding the disk inwardly relatively to the shaft, so that its inner stop face 14 engages with the stop face 9 of the guide block, then the axis of the eccentric disk is coincident with that of the driving shaft and causes the periphery of the disk to be arranged concentrically with reference to the driving shaft. Upon moving the eccentric disk outwardly relatively to the shaft, the periphery of the disk becomes more or less eccentric relatively to the shaft, the maximum eccentricity being

obtained when the disk has been moved outwardly on the guide block until the outer stop face 15 of the disk engages with the adjacent stop face 10 of the guide block, as shown in Fig. 3. It is therefore possible by this construction to vary the extent of eccentricity of the disk by sliding the same radially more or less on the guide block within the limits of the slot therein, and thereby permit of adjusting the throw or stroke of the members which is to be actuated by the rotary movement of the eccentric disk. The transmission of the effective movement of the eccentric disk is preferably accomplished by means of a circular strap 16 which embraces the periphery of the eccentric and engages in the annular groove 12 thereof, and a connecting rod 17 which is connected at one end with this eccentric strap and pivotally connected at its opposite end by a pin 18 with the respective shaking shoe or screen which is operated by this eccentric.

Various means may be provided for moving the eccentric disk radially with reference to the shaft, those shown in the drawings being suitable and preferred and as there shown the same are constructed as follows:

19 represents a shifting member which preferably is constructed in the form of a circular head which is mounted on the shaft adjacent to the eccentric, so as to be compelled to turn with the shaft but capable of sliding lengthwise thereon. This is preferably accomplished by means of a longitudinal spline 21 mounted on the shaft and engaging with a keyway in the bore of the shifting member, as shown in Fig. 4. The longitudinal movement of the shifter head may be effected by various means, for instance by means of a yoke provided with a shifting collar or ring 22 which engages an annular groove 20 in the periphery of the shifter head so as to be compelled to move lengthwise therewith but is held against turning with the same. This shifter head is operatively connected with the companion eccentric disk so that a longitudinal movement of the shifter head produces a radial movement of the eccentric disk relatively to the driving shaft. In the preferred form of the means whereby this is accomplished, a linkage is employed which comprises two links 23 arranged on opposite sides of the driving shaft and pivotally connected at one of their ends by means of a pin 24 with a lug 25 on the shifter head on one side of the axis of the driving shaft while the opposite ends of these links are connected by means of a pin 26 with a lug 27 arranged on the shifter head on the opposite sides of the driving shaft, as shown in Figs. 1, 2 and 4. Upon moving the shifter head toward the eccentric disk, the links 23 will assume a position more nearly at right angles to the driving shaft and thereby cause the eccentric disk to be moved radially outward to a greater or less extent relatively to the driving shaft and increase the eccentricity of the same accordingly, as well as the throw or stroke which the same imparts to the screen or shaking shoe with which the straps of this eccentric is operatively connected. Upon moving the shifter head away from the eccentric disk, the links will be caused to assume a position more nearly parallel with the axis of the driving shaft and thereby shift the eccentric disk inwardly so as to reduce its eccentric arrangement relatively to the driving shaft and consequently decrease the effectiveness of its throw on the screen or sieve which is actuated by this eccentric disk.

In order to confine the eccentric disk against longitudinal movement on the driving shaft while being operated upon by the shifter head, one side of the eccentric disk, viz: that opposite to the shifter head, is engaged by a thrust collar or retaining ring 28 which is secured to the adjacent part of the driving shaft by means of a set screw 29 while the pressure of the links and associated parts against the opposite side of the eccentric disk operate to hold the same in place against the thrust collar 28.

When two or more of these eccentric adjusting devices are mounted on the same shaft, the same may be timed so as to either move in unison for operating the same or different screens, or these eccentric devices may be connected with different screens, so as to move the same in opposite directions and balancing the machine. In the example given in the drawings, two eccentric devices are employed which are set one hundred eighty degrees apart so far as their operative effect is concerned, so that the two shaking screens 2, 3 with which they are connected will be reciprocated alternately in opposite directions.

In order to permit of simultaneously adjusting both of these eccentrics so that the effect of the same upon the shaking screens 2, 3, will be identical and thus maintain a perfect balance of the machine, means are provided for moving the shifting collars 19, 19 of both eccentric devices in unison for increasing the throw of the eccentric disks or decreasing the same. In the preferred form of the means for accomplishing this purpose a yoke is provided comprising a longitudinal bar 30 and two arms 31, 31 connecting opposite ends of this bar with the two shifting collars 19, 19. One of these arms is provided with an internally-screw threaded sleeve or nut 32 which receives an externally screw threaded portion 35 on a shifting rod 34 and the other arm of this yoke is provided with a guide sleeve 33 which receives another portion of this rod. The latter is

arranged horizontally and parallel with the driving shaft and is journaled in bearings 36, 37 which are carried by the adjacent part of the main frame. This rod may be turned, for instance, by means of a hand wheel 38 applied to one end thereof, and the same is held against lengthwise movement by means of two retaining collars 39, 40 secured thereto and engaging with opposite sides of the bearing 36. It follows from this construction that upon turning the shifting rod the screw connection between the same and the yoke will cause the latter to be shifted lengthwise of the driving shaft and adjust the eccentric disks accordingly while at the same time the yoke is guided lengthwise of the rod and shaft and is held against turning. This adjustment of the eccentrics can be effected either while the machine in which the same are embodied is standing still or is running, thereby enabling the operator to adjust these eccentrics at all times easily and accurately adapt the throw of the eccentrics to suit the particular needs of the material which is to be treated.

This mechanism is very compact and durable in construction, and the same is not liable to get out of order nor wear unduly. Furthermore this mechanism permits of putting standard machines of this character on the market and enable the same to be used in the plant where it is installed for separating or screening seeds, grains and other materials of different characteristics by simply adjusting the eccentric device accordingly, thereby reducing the cost of machining for this purpose as well as saving the room ordinarily required for maintaining such facilities.

We claim as our invention:

1. A mechanical movement for reciprocating two parts in opposite directions comprising a rotary driving shaft, two eccentric straps connected respectively with said parts, two eccentrics which receive said straps and which have their centers on diametrically opposite sides of said shaft, radial guides which are arranged on said shaft and upon which said eccentrics slide, and means for simultaneously adjusting said eccentrics radially relatively to said shaft comprising two shifting members movable lengthwise on said shaft but compelled to turn therewith, and a pair of links connecting each shifting member with one of said eccentrics, the pivotal connections between one pair of said links and the respective shifting member and eccentric being reverse of the corresponding pivotal connections between the other pair of links and its shifting member and eccentric.

2. A mechanical movement for reciprocating two parts in opposite directions comprising a rotary driving shaft, two eccentric straps connected respectively with said parts, two eccentrics which receive said straps and which have their centers on diametrically opposite sides of said shaft, radial guides which are arranged on said shaft and upon which said eccentrics slide, and means for simultaneously adjusting said eccentrics radially relatively to said shaft comprising two shifting members movable lengthwise on said shaft but compelled to turn therewith, a pair of links connecting each shifting member with one of said eccentrics, the pivotal connections between one pair of said links and the respective shifting member and eccentric being reverse of the corresponding pivotal connections between the other pair of links and its shifting member and eccentrics, a yoke connected with said shifting members so as to be movable therewith parallel with said shaft but incapable of turning therewith and provided with an internally threaded opening, and an adjusting shaft arranged parallel with said driving shaft and capable of turning but held against longitudinal motion and having an external screw thread which engages with said internally threaded opening.

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