Aug. 2, 1938. J. W. JOHNSTON 2,125,295

GRADING MACHINE

Filed April 24, 1935 3 Sheets-Sheet 1

Fig. 1.

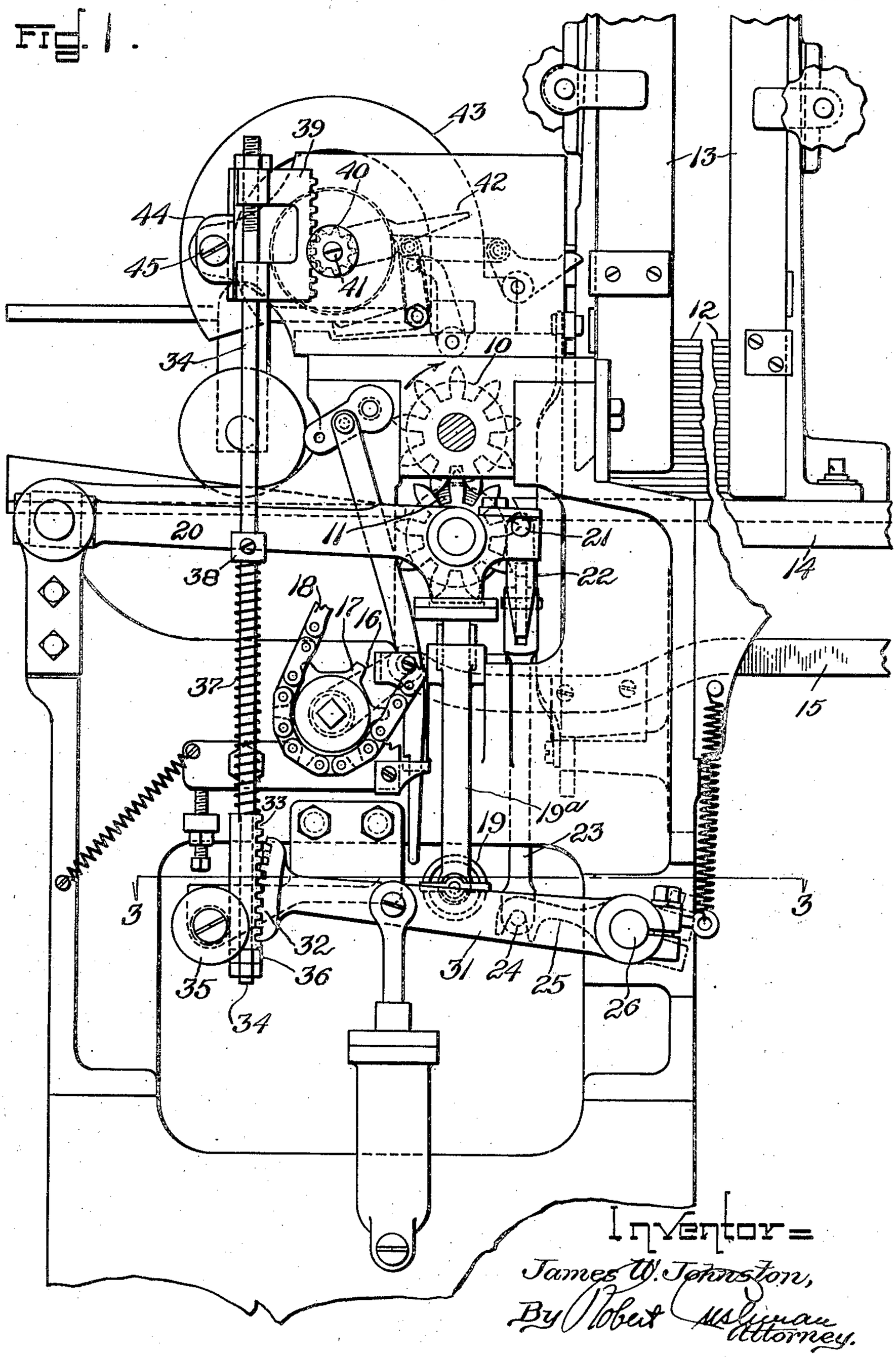

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Fig. 2.

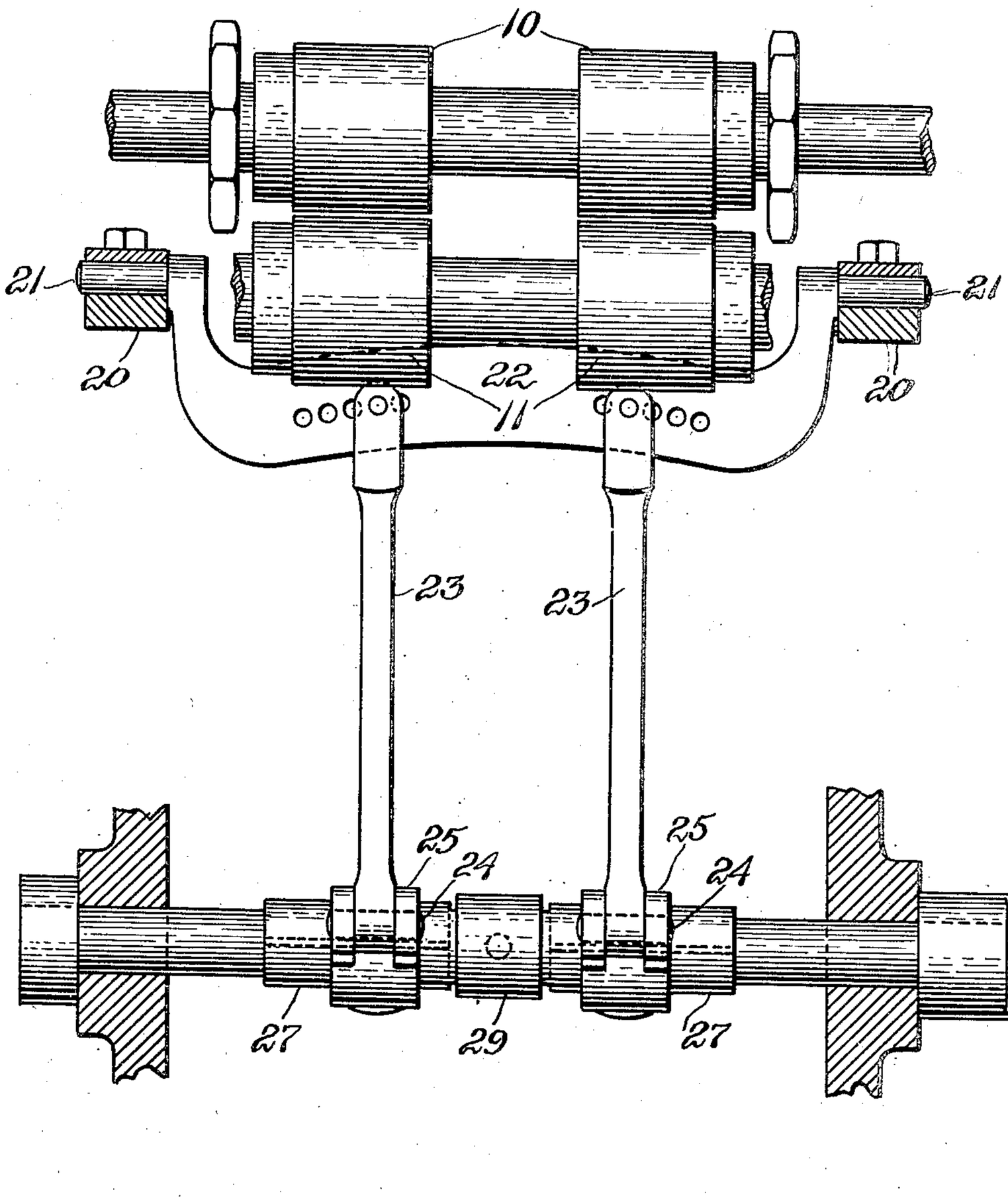

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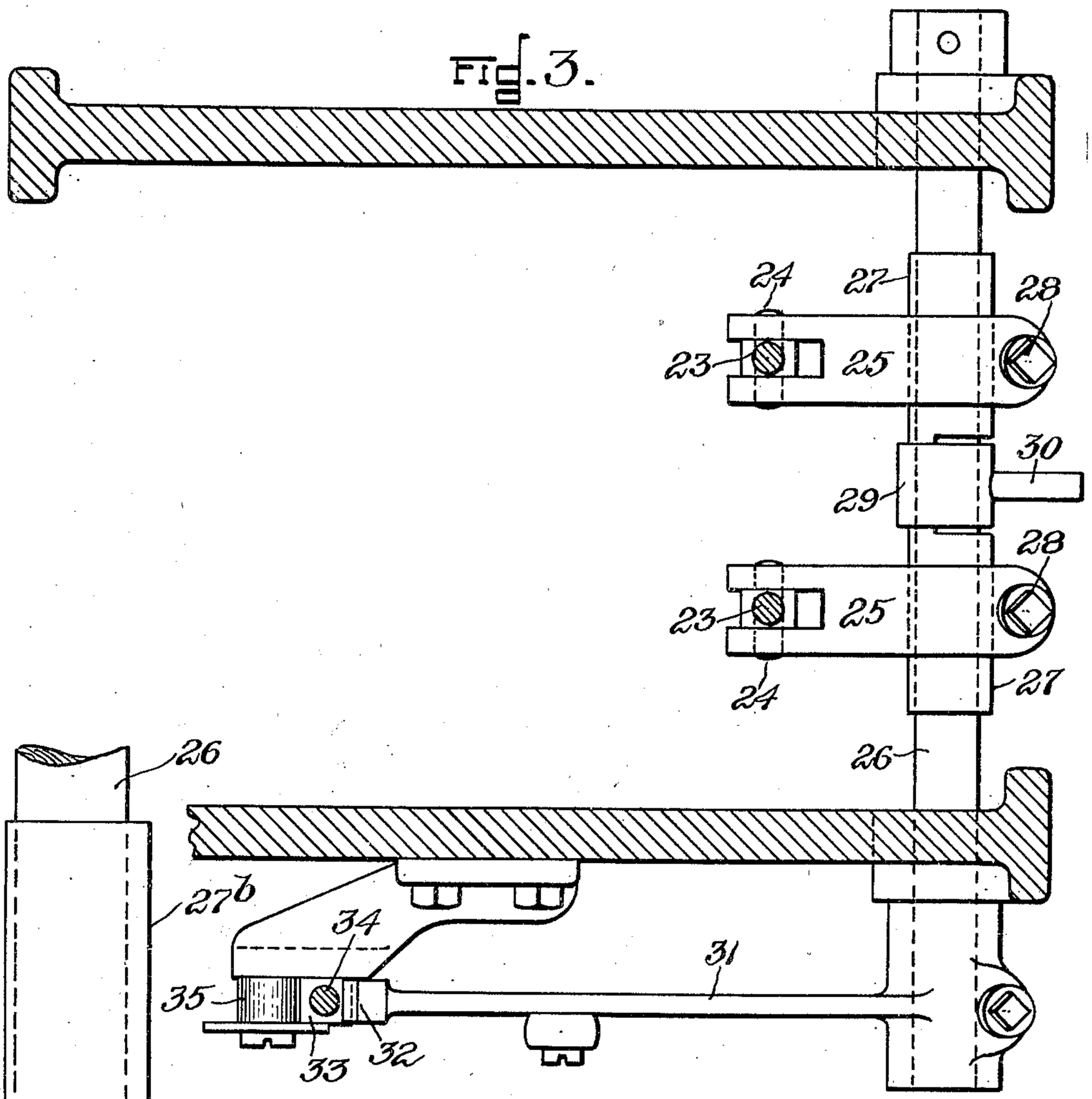
Fig. 3.



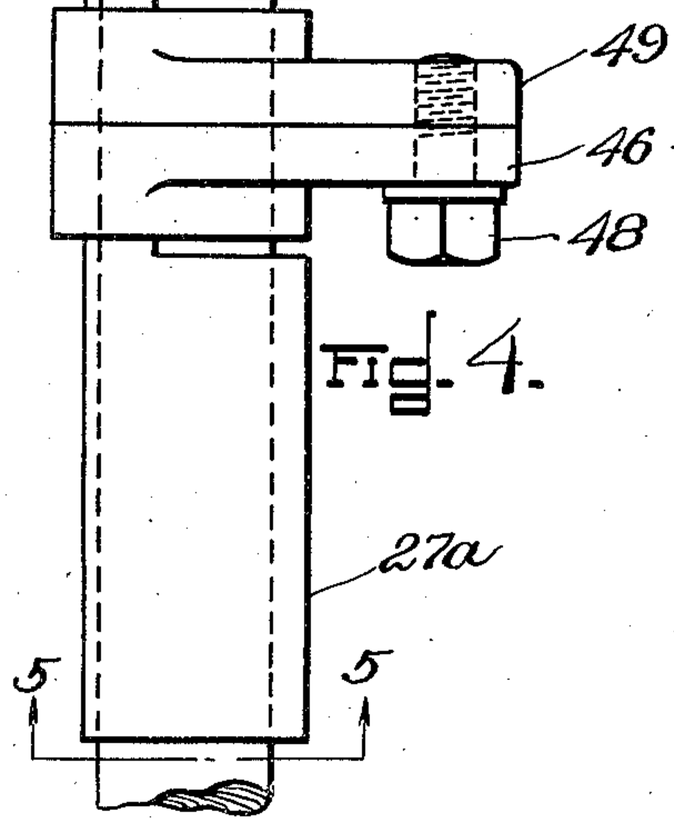


Fig. 4.

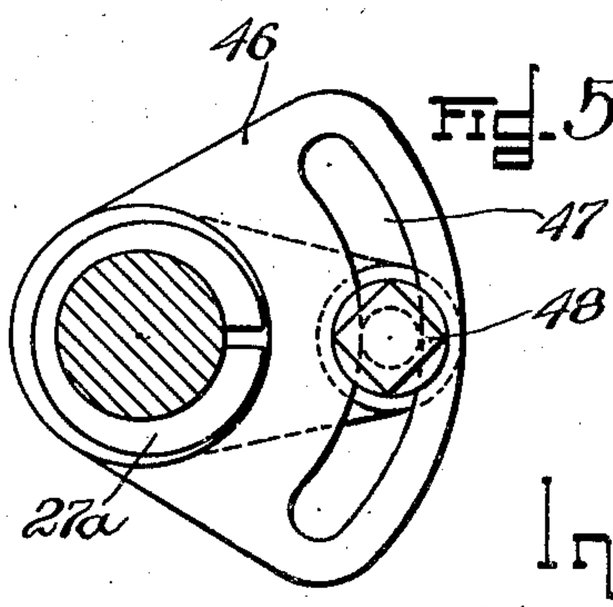


Fig. 5.

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UNITED STATES PATENT OFFICE

2,125,295

GRADING MACHINE

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Application April 24, 1935, Serial No. 17,949

10 Claims. (Cl. 33—147)

This invention relates to grading machines of the kind which grade died out pieces of leather, such as cut soles, taps, heel lifts, counters and other blanks, in accordance with the thinnest spot as determined by a detector.

The invention consists in certain improvements in the setting mechanism, through which the measuring movements of the detecting mechanism are transmitted to the grading mechanism, whereby the adjustment of the grading mechanism in response to the detecting mechanism is rendered more accurate and certain causes of inaccuracy in prior machines are corrected.

The invention is applicable to grading machines generally, and the expression grading mechanism, as herein used (unless limited expressly or by the context to some particular kind of grading mechanism), is used in the generic sense established in this art, and includes visual indicators, marking devices, sorting devices and evening devices.

For the purpose of illustration, however, a machine in which the brading mechanism consists of a visual indicator will be used to explain the invention, since it is to such a machine that the invention is especially applicable. As a specific example of such a machine, reference is made to the Cogswell Patent No. 1,820,010, dated August 25, 1931, for a more full and detailed description of its construction and mode of operation. Since the general characteristics of such machines are well known it will be necessary to describe herein only such parts as will aid in an understanding of the present invention.

In the accompanying drawings which illustrate the invention,

Fig. 1 is a side elevation of a grading machine embodying the invention, parts of the machine being broken away and parts being omitted for the sake of clearness;

Fig. 2 is a detail in elevation on a larger scale showing the detecting rolls and certain parts of the setting mechanism associated therewith;

Fig. 3 is a partial plan view and section on line 3—3 of Fig. 1 on a larger scale;

Fig. 4 is a detail in plan of a modification hereinafter described; and

Fig. 5 is an elevation partly in section on line 5—5 of Fig. 4.

The machine herein illustrated comprises a pair of continuously driven detecting and feeding rolls 10 and 11 to which the soles or other blanks 12 to be graded are automatically fed one at a time from the bottom of a magazine or hopper 13. The shelf 14 attached to the frame of the machine constitutes the bottom or floor of the magazine 13 for supporting a stack of blanks 12. Feeding mechanism of known construction, parts of which are shown at 15, 16, 17 and 18, slides the lowermost blank in the stack forwardly along the shelf 14 to the rolls 10 and 11, which constitute the detecting mechanism for detecting or measuring the grade of successive blanks according to their thickness, and which also feed or propel the blanks forwardly through the machine. For a more detailed description of the mechanism for feeding the blanks from the magazine to the detecting rolls, reference may be had to said Patent No. 1,820,010.

The upper roll 10 is journaled in fixed bearings on the frame of the machine. The lower roll 11 is yieldingly supported and is normally pressed upwardly toward the upper roll 10 by the usual mechanism including a coil spring 19 and a pair of bell-crank levers 19a; hence the lower roll automatically fits itself to the bottom side of the blank by bodily movements toward and from the upper roll and also by tilting movements in case the blank is uneven from side to side.

The lower roll 11 is journaled in bearings near the free ends of a pair of pivotally supported arms 20. The free ends of the arms 20 are connected by a yoke 22, whose ends 21 are pivoted in the ends of the arms 20. Pivotally connected to the yoke 22 are a pair of rods 23 each having a pin 24 at its lower end. Each pin 24 is engaged by a notch at the end of a lever arm 25 fixed to the rock shaft 26. The notches engage the tops of the pins 24 and are open at their under side. Therefore, either rod 23 may move downwardly independently of the other in response to tilting movements of the lower detecting roll 11, and any upward movement of either end of the roll 11 in response to a thin spot in the blank being measured will be transmitted to the rock shaft 26 notwithstanding the other edge of the blank may be relatively thick and consequently may not move the other rod 23 to the same extent.

At one end of the rock shaft 26 there is fixed an arm 31 provided at its free end with a gear segment 32 meshing with an endwise movable rack 33. The rack 33 is loosely mounted to slide upon the lower end of a rod 34 and is held in mesh with segment 32 and guided in its vertical movements by means of a flanged roller 35 journaled on a suitable bracket fixed to the frame of the machine. The lower end of rack 33 abuts against an adjustable nut 36 threaded on the lower end of the rod 34, and the upper end of rack 33 abuts against one end of a coil spring

37 surrounding the rod 34. The upper end of the coil spring 37 abuts against a collar 38 fixed to the rod. Thus downward movement of the arm 31 and segment 32 will positively move the rod 34 downwardly, while upward movement of the arm 31 and segment 32 will move the rod 34 upwardly, acting through the rack 33, coil spring 37 and collar 38, providing the rod is free to move upwardly. When the rod 34 is locked against upward movement any upward movement of arm 31 will merely act through the sliding rack 33 to compress spring 37.

Rigidly but adjustably fixed to the upper end of rod 34 is another rack 39 meshing with a pinion 40, fixed to the spindle or shaft 41 carrying a pointer 42, which constitutes part of a visual indicator of known form. The usual indicator scale, not shown, is applied to the fixed segment 43. The rack 39 is held in mesh with the pinion 40 by a guide block 44 rigidly fixed to the frame of the machine and having a sliding engagement with the back side of the rack 39.

The mechanism by which only the thinnest measurement of a blank, as determined by the detecting rolls, is transmitted to and preserved by the indicator is well known in this art and may be substantially the same as that described in said Patent No. 1,820,010.

The machine in its general construction and mode of operation may be the same as known machines of the prior art and no further detailed description will be necessary to an understanding of the present invention.

The present invention resides in certain improvements in the setting mechanism through which the measurements ascertained by the detecting mechanism (herein shown as detecting rolls 10 and 11) are transmitted to the grading mechanism (herein shown as a visual indicator including the pointer 42), and its object is to increase the accuracy of the adjustment of the grading mechanism in response to the delicate measurements ascertained by the detecting mechanism, and to counteract causes of inaccuracy which were inherent in the former machines.

It is obvious that in order to secure an accurate adjustment of the grading mechanism in response to the detecting mechanism, the setting mechanism must be so constructed as to insure a definite, predetermined ratio between the extent of movement of the detecting mechanism and the extent of the adjustment of the grading mechanism. If the machine is designed and constructed for a given ratio any departure from that ratio will result in incorrect grading. In grading machines for performing certain types of grading, such as visually indicating, marking or sorting the blanks according to their grade, it is necessary that the movements of the detecting mechanism be greatly amplified in the movements transmitted to the grading mechanism. For example, in the machine herein shown for the purpose of illustration, it will be observed that the extent of the movement imparted to the lower detecting roll 11 by a blank passing between the rolls 10 and 11 is small, the maximum range of such movement being in the case of a leather sole, for instance, only a small fraction of an inch. This small detecting and measuring movement of the roll 11 in being transmitted through the setting mechanism to the grading mechanism (the visual indicator) is greatly multiplied in the movement of the pointer 42. Consequently if there is any inaccuracy in the setting mechanism, which transmits the measurements found by the roll 11, such inaccuracy will also be multiplied and aggravated in the reading of the indicator.

In the commercial manufacture of these machines it has been found, as a practical matter, well-nigh impossible or difficult to construct all of them exactly alike so as to insure a correct ratio between the movement of the detecting roll and the movement of the grading device. Since the effective length of the lever arms 25 is an important factor controlling the extent of adjustment of the grading device, it has been the practice to specially construct each such lever arm as required to make it the correct length for the individual machine in which it was used.

Heretofore the lever arms 25 have been fastened directly upon the rock shaft 26 and the effective length of each lever arm, as represented by the distance between the axis of the shaft 26 and the axis of pin 24, could not be varied.

In accordance with the present invention the hub of each lever arm 25 instead of being mounted directly on rock shaft 26 and therefore being always concentric therewith, is mounted on an eccentric which is rotatively adjustable on the rock shaft, whereby the effective length of the lever arm from the axis of the rock shaft 26 to the axis of pin 24 may be varied. The hub of each lever arm 25 is split and clamped rigidly in position upon a split eccentric 27 by means of a bolt 28, the contraction of the hub of the arm 25 by the bolt 28 serving also to clamp the split eccentric 27 tightly on the rock shaft 26 so that normally the rock shaft, the split eccentric 27 and the lever arm 25 move together.

As shown in Figs. 2 and 3, there is a split eccentric 27 for each of the two arms 25. The two eccentrics are integrally or rigidly connected with an intermediate unsplit sleeve or hub 29, loosely surrounding shaft 26, and provided with an arm or handle 30 by means of which the two eccentrics may be rotatively adjusted in unison on the rock shaft after the screws 28 are loosened.

By thus varying the effective length of the arms 25 the ratio between the movements of the detecting mechanism and the movements of the grading mechanism can be accurately regulated.

It sometimes happens that it is necessary to vary the effective length of only one of the lever arms 25, or to vary one more than the other, or to lengthen one and shorten the other. In order to accomplish these ends and to make it possible either to adjust the two eccentrics independently of each other or to adjust them together as a single part, as may be desired, I have provided an alternative construction consisting of two separate and independent split eccentrics 27a and 27b, as shown in Figs. 4 and 5. These individually adjustable split eccentrics will be clamped on the rock shaft 26, each by one of the split hubs of the lever arms 25 in the manner already described. Rigidly attached to the inner end of the split eccentric 27a is a sleeve loose on the rock shaft and made with a segment-shaped arm 46, in which is formed an arcuate slot 47 concentric with the axis of rock shaft 26. The inner end of the split eccentric 27b is also rigidly connected to a sleeve loose on the rock shaft. This sleeve abuts against the similar sleeve on eccentric 27a, and carries an arm 49 which extends alongside the arm 46. A headed screw 48 projects through slot 47 and is threaded into

the arm 49. When the screw 48 is set up tight and the clamping bolts 28 on the split hubs of the lever arms 25 are loosened, the two eccentrics 27a and 27b may be rotated together as a single part in the same manner as described in connection with the structure shown in Fig. 3; but when the screw 48 is loosened, either eccentric 27a or 27b may be adjusted independently of the other, thereby varying the effective length of either lever arm 25 to whatever extent may be necessary, independently of the other.

Another error inherent in the construction of the prior grading machines of the kind herein illustrated has been due to the fact that the lower end of the rod 34 has been pivotally connected to the free end of the arm 31, with the result that as the arm 31 swings up and down said pivotal connection moves in the arc of a circle, thereby laterally displacing the lower end of rod 34 to such an extent that it has been necessary to provide for pivotal movement of the guide block 44 on the screw 45, by which the guide block was loosely attached to the frame of the machine. This construction introduced an error into the operation of the grading device due to the lateral swinging movement imparted to the rod 34, which also caused the rack 39 to rock on the axis of screw 45. It will be understood that it was customary to set up the machine so that when the arm 31 was horizontal the pointer 42 would be in a vertical position midway between the two extremes of its movement over the dial. The result was that when the pointer was swung toward either of its extreme positions in response to a very thick or a very thin blank it would not accurately record the true measurements of the blank. The construction herein described by which the up and down movements of the arm 31 are imparted to the rod 34 through a gear segment 32 and rack 33 makes it possible to confine the rod 34 and rack 39 to a true rectilinear movement, which correctly transmits to the pointer 42 the measuring movements of arm 31.

I claim:

1. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including means whereby the ratio between the movement of the detecting mechanism and the movement of the grading mechanism may be varied.

2. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, an eccentric rotatively adjustable on the rock shaft, and a lever arm having a hub embracing the eccentric, whereby the effective length of the lever arm may be varied by rotating the eccentric relatively to the rock shaft and the lever arm.

3. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, an eccentric rotatively adjustable on the rock shaft, and a lever arm having a hub embracing the eccentric, whereby the effective length of the lever arm may be varied by rotating the eccentric relatively to the rock shaft and the lever arm and means to fasten the parts in adjusted position.

4. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, an eccentric in the form of split sleeve mounted on the rock shaft and rotatively adjustable thereon, a lever arm having a split hub embracing the eccentric, and means to fasten the parts in adjusted position.

5. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, an eccentric in the form of split sleeve mounted on the rock shaft and rotatively adjustable thereon, a lever arm having a split hub embracing the eccentric, and a single clamping device serving both to clamp the split hub on the eccentric and to clamp the split eccentric on the rock shaft.

6. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, two eccentrics in the form of split sleeves connected together for rotative adjustment as a single part and mounted on the rock shaft, two lever arms each having a split hub embracing one of the eccentrics, and means to fasten the parts in adjusted position.

7. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, two eccentrics, each in the form of a split sleeve mounted on the rock shaft and rotatively adjustable thereon each independently of the other, two lever arms each having a split hub embracing one of the eccentrics, and means to fasten the parts in adjusted position.

8. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the de-

tecting mechanism, said setting mechanism including a rock shaft, two eccentrics, each in the form of a split sleeve mounted on the rock shaft and rotatively adjustable thereon each independently of the other, two lever arms each having a split hub embracing one of the eccentrics, and means to fasten each hub and its eccentric to the shaft independently of the other hub and its eccentric.

9. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, two eccentrics, each in the form of a split sleeve mounted on the rock shaft and rotatively adjustable thereon each independently of the other, two lever arms each having a split hub embracing one of the eccentrics, and means to fasten each hub and its eccentric to the shaft independently of the other hub and its eccentric and means operable to adjust both eccentrics together and also operable to adjust either eccentric independently of the other.

10. A grading machine comprising detecting mechanism for detecting the grade of successive blanks according to their thickness, adjustable grading mechanism controlled by the detecting mechanism, and setting mechanism for setting the grading mechanism in accordance with the grade of the blanks as determined by the detecting mechanism, said setting mechanism including a rock shaft, two eccentrics, each in the form of a split sleeve mounted on the rock shaft and rotatively adjustable thereon, an unsplit sleeve loosely mounted on the rock shaft and rigidly connected to both eccentrics, an operating member on the unsplit sleeve for rotatively adjusting the two eccentrics, and two lever arms each having a hub embracing one of the eccentrics.

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