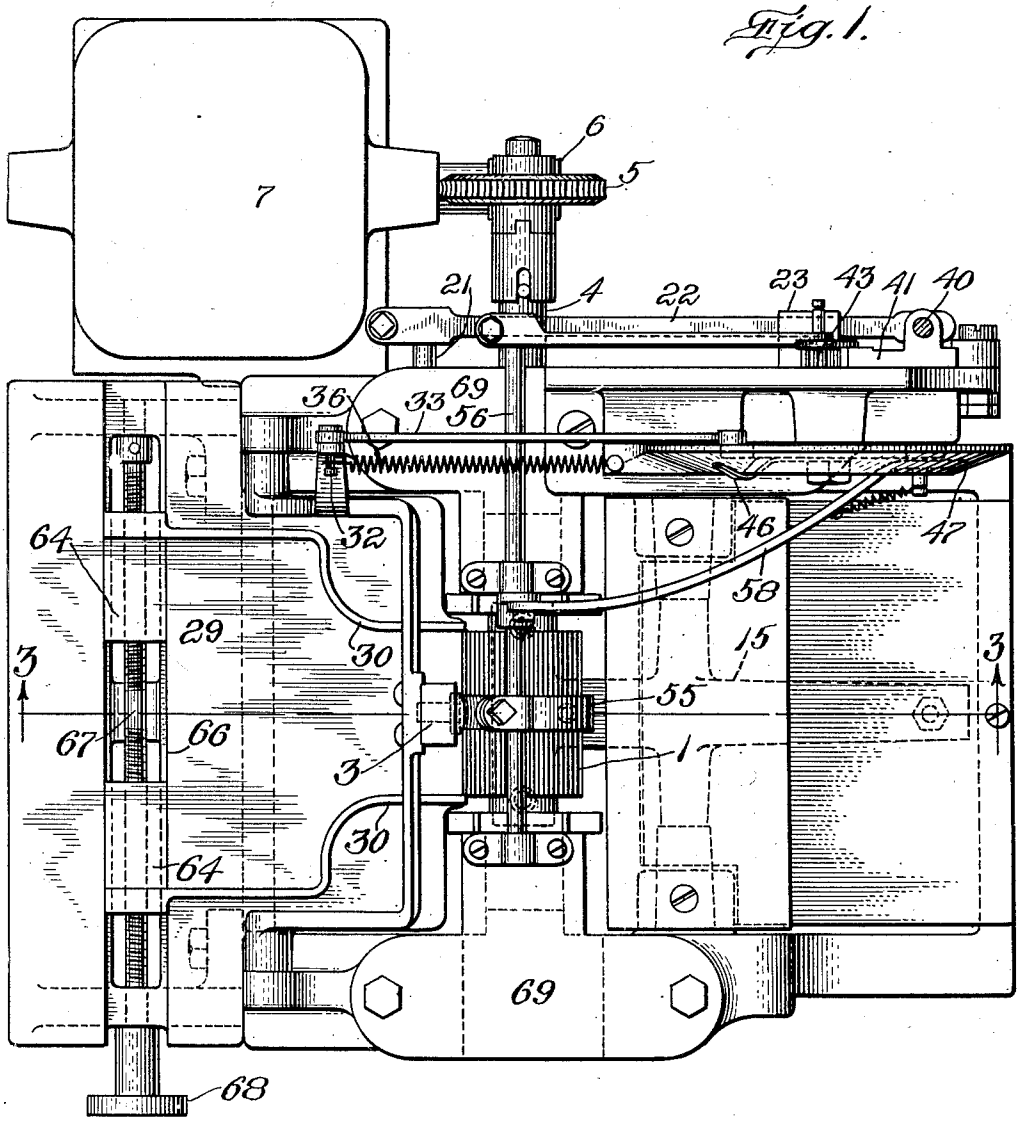
April 5, 1932. J. W. JOHNSTON 1,852,720

GRADING MACHINE

Filed Dec. 26, 1929 4 Sheets-Sheet 1

Fig. 1.



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GRADING MACHINE

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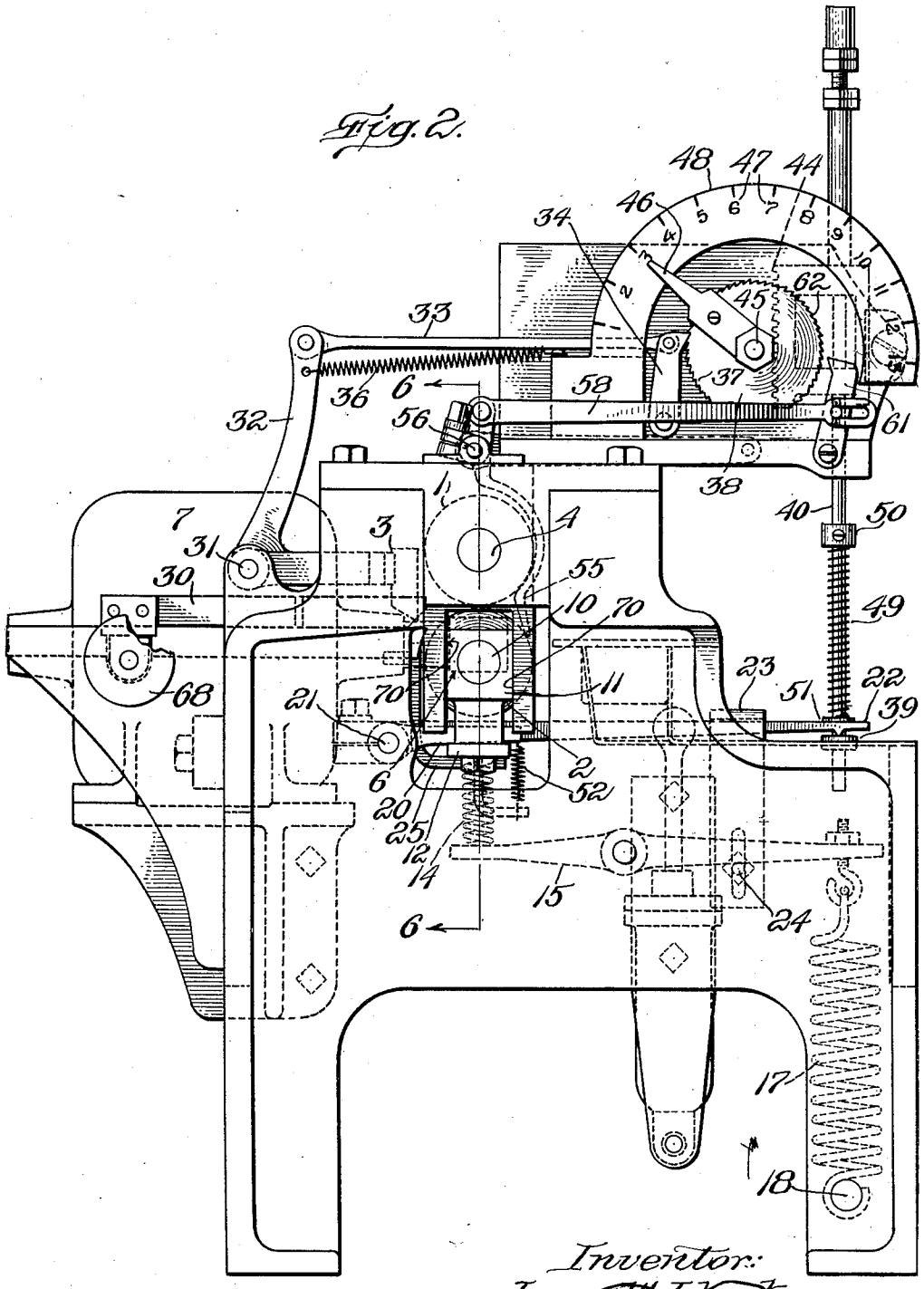
Fig. 2.



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GRADING MACHINE

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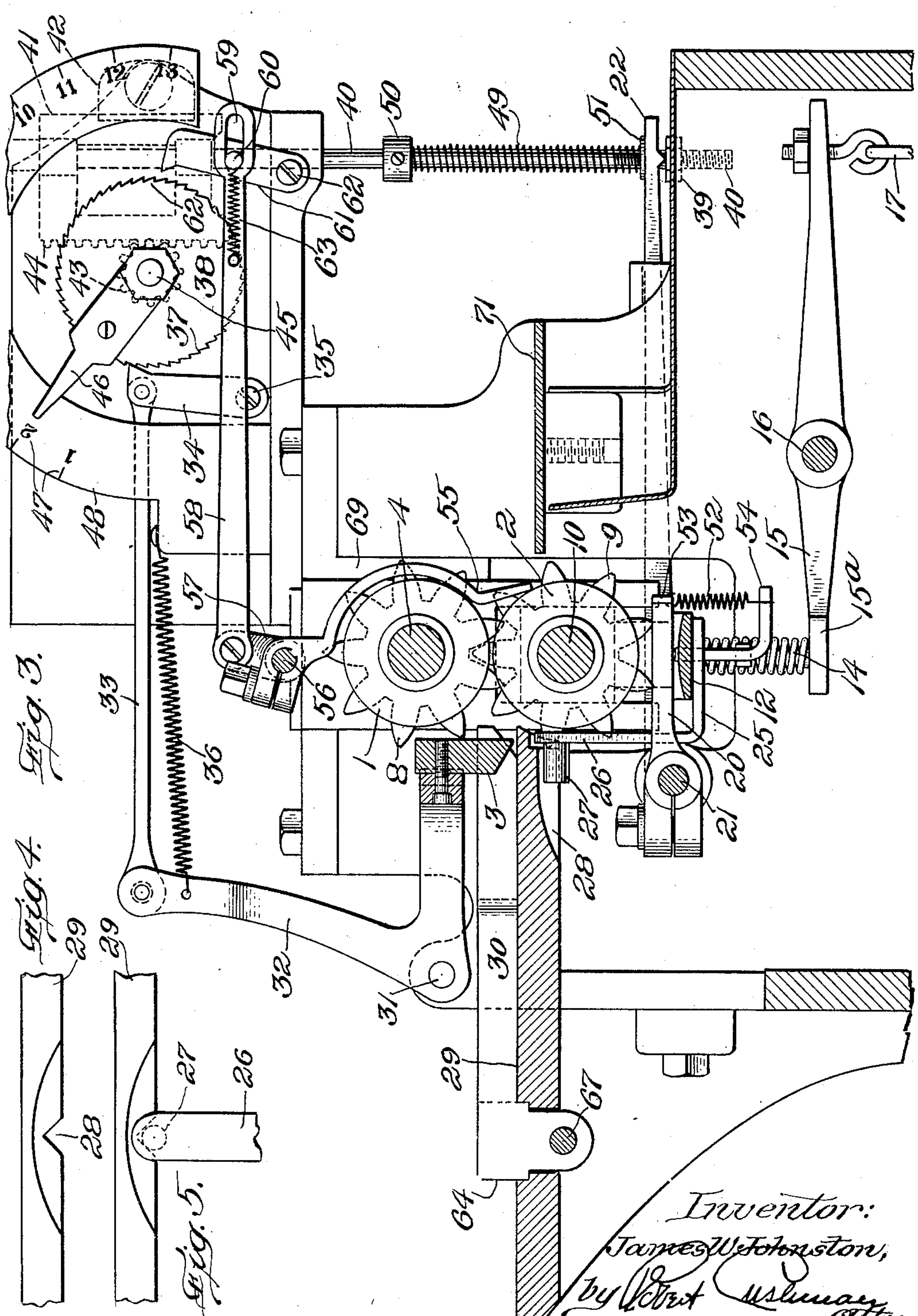

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GRADING MACHINE

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Fig. 6.

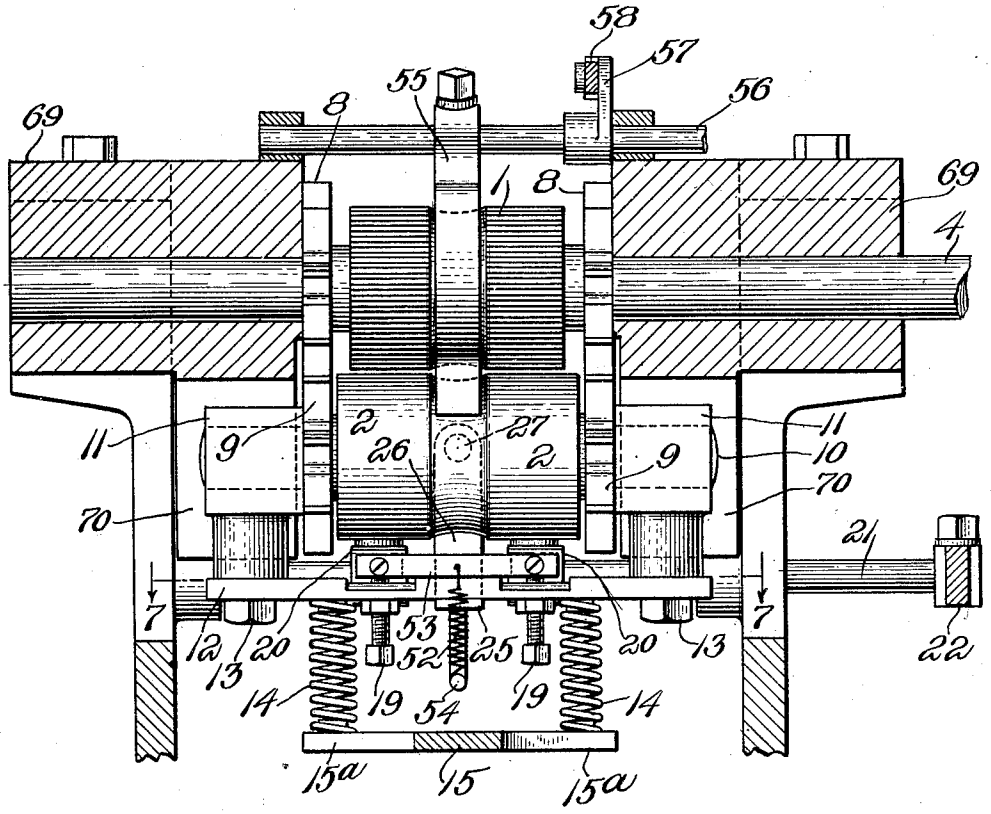
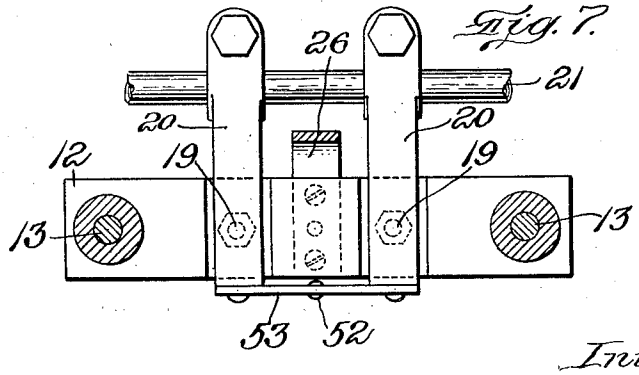


Fig. 7.



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UNITED STATES PATENT OFFICE

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GRADING MACHINE

Application filed December 26, 1929. Serial No. 416,427.

This invention relates to grading machines, and while capable of more general application, it has particular reference to grading machines of the kind described in Letters Patent of the United States to Nichols, No. 1,582,140, dated April 27, 1926, in which the grading device consists of a visual indicator.

The machine is so designed that it can be used for very small pieces or blanks. It is common practice for the purpose of economy to build up heels from small pieces or segments, two or more of which are fitted together edgewise to constitute a lift. In order to enable the machine to handle such lift segments or other small pieces, and to insure sufficient flexibility to permit one of the detecting rolls to tilt freely with relation to the other in response to a pronounced irregularity in thickness between one side of a blank and the other, the detecting rolls are made much shorter than heretofore so that as they are moved out of parallelism with a small uneven blank between them their ends will not meet or interfere.

Particular features of the invention consist in novel means for yieldingly supporting the movable detecting roll and pressing it toward the other roll; novel positioning and centering means for restoring the movable detecting roll to its proper relation to the other roll after separation therefrom; novel means for transmitting the measuring movements of the detecting roll to the grading mechanism; and a novel trip for preserving or maintaining the thinness measurements as determined by the detecting roll.

In the accompanying drawings which illustrate a preferred embodiment of the invention;

Fig. 1 is a plan view of a grading machine especially designed for handling small pieces such as heel lift segments;

Fig. 2 is a side elevation of the machine;

Fig. 3 is a vertical section on line 3—3 of Fig. 1;

Figs. 4 and 5 are detail views in elevation illustrating the centering means for the movable detecting roll;

Fig. 6 is a vertical cross section on line 6—6 of Fig. 2; and

Fig. 7 is a section on line 7—7 of Fig. 6.

The machine includes a pair of continuously driven detecting rolls 1 and 2 to which the blanks are fed one at a time under the gate 3. The gate 3 controls the usual detent pawl as hereinafter described. The lower edge of the gate 3 is beveled or inclined, as clearly shown in Figs. 2 and 3, so that as a blank is pushed forward toward the detecting rolls under gate 3, the latter will ride up on top of the blank. The shaft 4 of the upper detecting roll 1 is journaled in fixed bearing boxes 69 and is provided at one end outside of the machine frame with a worm wheel 5 which is continuously driven by a worm 6 fast on the armature shaft of a motor 7 secured to a bracket on one side of the machine frame. Shaft 4 also has fixed thereon two gears 8, 8, meshing with two gears 9, 9, which are fast on shaft 10 of the lower detecting roll 2.

Shaft 10 is mounted in journal boxes 11 which are vertically movable in slideways 70 on the frame of the machine. The journal boxes 11 are connected by a crossbar 12 by screws or bolts 13, said journal boxes and crossbar constituting a solid yoke for supporting the lower detecting roll 2 and permitting the adjustment of either end of said roll independently of the other end. This yoke is in turn supported by two springs 14, 14, whose upper ends bear against the under side of crossbar 12 and whose lower ends are seated on the ends of a cross-head 15^a forming part of one arm of lever 15, fulcrumed at 16 on the frame of the machine. The other arm of lever 15 is connected by a tension spring 17 to the frame of the machine at 18. The spring 17 constitutes a yielding support for the arm of lever 15 on which the springs 14, 14, are seated, and acts in opposition to springs 14, 14, with a pressure less than that of the sum of the springs 14, 14, but greater than that of either individual spring 14, whereby downward pressure exerted by the roll 2 on both springs 14, 14, will cause spring 17 to yield first, but downward pressure on either individual spring 14, 14, under tilting move-

ments of the roll 2, will cause such individual spring to yield first.

The crossbar 12 of the roll-supporting yoke carries a pair of adjustable abutment screws 19 whose upper ends engage the under side of a pair of levers 20, 20, fixed to and projecting from a rock shaft 21 journaled on the frame of the machine, said levers being positioned one at each side of the middle of the yoke. When the roll 2 and yoke 12 is caused to tilt out of parallelism with roll 1 by an uneven blank, the higher of the two abutment screws 19 remains in engagement with its lever 20 and determines the adjustment of the grading means in accordance with the measurement of the thinner side of the blank as determined by roll 2. Rock shaft 21 also carries at one end, which projects outside the frame of the machine, a rearwardly extending lever arm 22 positioned beneath a stop abutment 23 attached to the machine frame, with provision for vertical adjustment, by means of a screw and slot connection 24, (Fig. 2).

Fastened to the under side of crossbar 12 of the yoke which supports the lower detecting roll 2 is a bracket 25 having an upstanding arm 26 in front of said lower detecting roll. Arm 26 is provided on its front face with a guiding stud 27 which is normally seated within a guide in the form of a V-shaped notch or socket 28 formed on the under side of the table or bed-plate 29. The engagement of the stud 27 with the notch 28 limits the upward movement of the lower detecting roll 2 under the influence of springs 17 and 14, and when the roll 2, after separation from the roll 1, moves toward roll 1 the guiding stud 27 engages the walls of the V-shaped guiding notch 28 and positions the roll 2 longitudinally and properly centers it with relation to roll 1 so that the rolls will be in proper position to receive and measure the next blank. When the stud is in engagement with the notch the abutment stop 23 is so adjusted as to engage or approximately engage the arm 22.

As each blank is fed forward on top of table 29 between guides 30, 30, toward the detecting rolls it engages and lifts gate 3. Gate 3 is pivoted at 31 on the frame of the machine and is made with an upwardly extending arm 32 connected by a link 33 with a detent pawl 34 pivotally mounted at 35 on the machine frame. A spring 36 connected at one end to arm 32 and at the other end to the machine frame yieldingly holds the gate 3 in its lowered position (supplemented by gravity) and thereby holds the detent pawl 34 in engagement with a series of ratchet teeth 37 provided on ratchet wheel 38.

The free end of arm 22 engages the top side of a collar 39 fast on a vertical stem or rod 40 which carries at its upper end a rack slide 41 movable vertically between a guide block 42 on the frame of the machine and a pinion 43, said rack slide 41 being made with rack or gear teeth 44 engaging the pinion 43. The pinion 43 is fast on a short horizontal shaft 45 journaled in a bearing on the machine frame. Ratchet wheel 38 and a pointer 46 are also secured fast to shaft 45. The pointer 46 moves over an indicator scale 47 graduated to indicate irons and half irons displayed on a dial segment 48 concentric with shaft 45. This scale and pointer visually indicate the grade measurement of the blanks as determined by the detecting rolls in the same general manner as explained in said Nichols Patent No. 1,582,140.

The lower end of the vertical rod 40 extends through an aperture in arm 22 and has mounted upon it immediately above the arm 22 a coil spring 49 whose upper end bears against a fixed collar 50 and whose lower end bears against a loose collar or washer 51 seated on top of arm 22.

The up and down movement of the lower detecting roll 2 are transmitted to the lever arm 22 through the yoke bar 12 and the levers 20. Upward movement of the detecting roll 2 lifts levers 20 and consequently arm 22, and downward movement of the detecting roll 2 tends to depress arm 22 through spring 52 connected at its upper end to a crossbar 53 fast to the ends of levers 20, 20, and at its lower end to an angular post 54 projecting downward from the under side of crossbar 12.

A trip 55 is rigidly mounted on a rock shaft 56 above the detecting rolls and extends downward closely following the periphery of the roll 1 with its free end positioned close to the bite of the rolls on the delivery side thereof. Rock shaft 56 is journaled on the machine frame above roll 1 and has fixed thereto a short arm 57 which is connected by a link 58 to detent pawl 61. The rear end of link 58 is made with a slot 69 which engages a stud or pin 60 on the side of pawl 61. Pawl 61 is pivoted to the machine frame at 62. A spring 63 connecting the stud 60 and the link 58 tends yieldingly to urge the pawl 61 to the left (Fig. 3) and to hold the stud 60 is engagement with the left-hand end of slot 59. When the trip 55 occupies its normal position, as shown in the drawings, the stud 60 holds detent pawl 61 out of engagement with the ratchet teeth 62 on ratchet wheel 38. It will be observed that the ratchet teeth 62 face in the opposite direction to the ratchet teeth 37. When trip 55 is swung to the right by a blank emerging from the detecting rolls, it acts through rock shaft 56, link 58 and spring 63 to swing the detent pawl 61 into engagement with the ratchet wheel 38 thereby locking the pointer 46 against further movement to the right, but permitting it to move to the left, thus preserving in the grading device the measurement of succes-

sively thinner spots in a blank as determined by the detecting rolls.

The feed guides 30, 30, on top of the table 29 are each rigidly connected to a slide 64 mounted within a transverse slot 66 provided in table 29. Each slide 64 is threaded on an adjusting shaft 67 journaled in bearings provided on table 29. The threaded connection between the shaft 67 and one slide 64 is right-handed while the threaded connection between the other slide 64 and the shaft 67 is left-handed. Thus, when the shaft 67 is rotated by the hand wheel 68 in either direction, the two slides 64 will be adjusted simultaneously toward or from each other, thereby adjusting the spacing between the guides 30.

A shelf 71 is provided at the delivery side of the rolls 1 and 2 to receive the blanks as they are delivered from the rolls.

In operation, the blanks are fed in one by one over table 29 by hand (or it may be by an automatic feeding mechanism such as that shown in the Cogswell Patent No. 1,686,487 of October 2, 1928). As a blank is shoved under gate 3 the latter is raised thereby swinging arm 32 and link 33 to the left and disengaging detent pawl 34 from rack 37. The shaft 45 and pointer 46 are thus freed from restraint and tend to turn to the left to starting position under the influence of the usual spring, not shown. As soon as the blank enters between the rolls 1 and 2 the latter will be moved downwardly more or less depending upon the thickness of the blank and this movement will be transmitted through the yoke 11, 12, spring 52, levers 20, rock shaft 21, arm 22, vertical rod 40 and rack slide 41 to the pinion 43, thereby correspondingly adjusting the pointer 46. The adjustment of pointer 46 will, of course, not be preserved so long as both pawls 34 and 61 are disengaged from ratchet wheel 38 but as soon as the advance end of the blank emerges from the bite of the detecting rolls and swings trip 55 to the right, the trip will act through rock shaft 56, arm 57 and link 58 to engage detent pawl 61 with its ratchet 62. From that point as the blank progresses through the feeding and detecting rolls 1 and 2, the pointer 46 will not be affected by thicker spots in the blank encountered by the detecting rolls, since thicker spots tend to move the pointer 46 to the right and the pointer shaft 45 is now locked against movement in that direction by the detent pawl 61. The shaft 45 and pointer 46 will, however, be free to turn to the left in response to successively thinner spots encountered by the detecting rolls, since the gate 3 is still resting on top of the blank and the pawl 34 is therefore disengaged from its ratchet 37. As soon as the rear or trailing end of the blank passes out from under the gate 3, the latter drops and causes pawl 34 to engage its ratchet thus locking the pointer shaft 45 and pointer 46 against movement in either direction. The pointer will now indicate on the scale 47 the thickness in irons of the thinnest spot in the blank as determined by the detecting rolls. When the blank is finally delivered from the detecting rolls and falls on table 71 the trip 55 will return to normal position thus unlocking pawl 61 but the adjustment of the pointer will not be disturbed since the pointer has a normal bias, as usual, toward zero position and is still held in its adjusted position by pawl 34. The operator having read the grade of the blank on the indicator may then remove it from table 71 and distribute it into its appropriate receptacle, if the blanks are to be sorted according to grade, or otherwise disposed of it.

As soon as the next succeeding blank is fed under trip 3, pawl 34 will be disengaged and the pointer 46 will be again freed to register the grade of the succeeding blank as already explained.

Any upward movement of the detecting roll 2 and arm 22, while pawl 34 is locked to its ratchet, is taken up by spring 49, and any downward movement of the detecting roll 2 while pawl 61 is locked to its ratchet, is taken up by spring 52.

When the blank passes between the detecting rolls and depresses roll 2, the stud 27 necessarily moves away from the V-shaped guide 28. As the blanks are usually uneven from side to side the roll 2 instead of being moved downwardly in exact parallelism with the roll 1 is usually caused to tilt somewhat and may be thereby somewhat displaced endwise. When the blank passes out from between the detecting rolls and the lower roll is again moved upwardly by its springs 14 and 17, the stud 27 enters the V-shaped notch 28 and by its engagement therewith centers or justifies the lower detecting roll so that the two rolls will be in true and accurate position for receiving and detecting the next blank entering the machine.

I claim:

1. In a grading machine, a pair of detecting rolls, one of which is movable bodily toward and from the other, a yoke upon which said movable roll is journaled, two springs one at each side of the middle of the yoke for yieldingly supporting the yoke and its roll so that each end thereof is independently adjustable toward and from the other other roll in the direction of the pressure of the springs, a movable member against which said two springs are seated and a yielding support acting upon said member in opposition to said two springs.

2. In a grading machine, a pair of detecting rolls, one of which is movable bodily toward and from the other, a yoke upon which said movable roll is journaled, two springs one at each side of the middle of the yoke for yieldingly supporting the yoke

and its roll so that each end thereof is independently adjustable toward and from the other roll in the direction of the pressure of the springs, a lever against one arm of which said two springs are seated and a spring acting upon the other arm of said lever in opposition to said two springs.

3. In a grading machine, a pair of detecting rolls, one of which is movable bodily toward and from the other, a yoke upon which said movable roll is journaled, two springs one at each side of the middle of the yoke for yieldingly supporting the yoke and its roll so that each end thereof is independently adjustable toward and from the other roll in the direction of the pressure of the springs, a lever, one arm of which is provided with a cross head against the ends of which said two springs are seated, and a spring acting upon the other arm of said lever in opposition to said two springs.

4. In a grading machine, detecting mechanism including a roll journaled in fixed bearings, a roll journaled in movable bearings permitting the ends of the roll to be independently adjusted toward and from the fixed roll and also permitting the adjustable roll to be shifted endwise with relation to the fixed roll, means yieldingly urging the adjustable roll toward the fixed roll and means operable by the movement of the endwise displaced adjustable roll toward the fixed roll for positioning the adjustable roll longitudinally with relation to the fixed roll.

5. In a grading machine, a pair of detecting rolls one of which is journaled in fixed bearings, a yoke on which the other roll is journaled, said yoke and its roll being bodily adjustable toward and from the fixed roll, means for yieldingly urging said yoke and its roll toward the fixed roll, a guiding member projecting from the middle of said yoke and a fixed guiding member on the frame of the machine, said guiding members being adapted to engage when the yielding roll moves toward the fixed roll and to position and center said yoke and its roll longitudinally with relation to said fixed roll.

6. In a grading machine, a pair of detecting rolls one of which is journaled in fixed bearings, a yoke on which the other roll is journaled, said yoke and its roll being bodily adjustable toward and from the fixed roll, means for yieldingly urging said yoke and its roll toward the fixed roll, a guiding member projecting from the middle of said yoke and a fixed guiding member on the frame of the machine, said guiding members being adapted to engage when the yielding roll moves toward the fixed roll and to position and center said yoke and its roll longitudinally with relation to said fixed roll, said guiding members also constituting a stop to limit the movement of said movable roll toward said fixed roll.

7. In a grading machine, a pair of detecting rolls one of which is journaled in fixed bearings, a yoke on which the other roll is journaled, said yoke and its roll being bodily adjustable toward and from the fixed roll, means for yieldingly urging said yoke and its roll toward the fixed roll, a guiding member projecting from the middle of said yoke and a fixed guiding member on the frame of the machine having a V-shaped notch adapted to cooperate with the guiding member on the yoke, said guiding members being adapted to engage when the yielding roll moves toward the fixed roll and to position and center said yoke and its roll longitudinally with relation to said fixed roll.

8. In a grading machine a pair of detecting rolls, a yoke on which one of said rolls is mounted, said yoke being bodily movable with its roll toward and from the other roll, means yieldingly pressing said yoke and its roll toward the other roll, grading means and mechanism for adjusting the grading means in response to movements of said yoke and its roll, said adjusting mechanism including a rock shaft, a lever arm fixed to said rock shaft and positively actuated by the yoke in one direction, a pair of levers fixed to said rock shaft and extending above said yoke whereby said yoke will positively move the lever arm upward, and a spring connecting said pair of levers to said yoke, whereby the yoke will move said lever arm yieldingly downward.

9. In a grading machine, a pair of detecting rolls, a yoke on which one of said rolls is mounted, said yoke being bodily movable with its roll toward and from the other roll, means yieldingly pressing said yoke and its roll toward the other roll, grading means and mechanism for adjusting the grading means in response to movements of said yoke and its roll, said adjusting mechanism including a rock shaft, a lever arm fixed to said rock shaft, a pair of other levers fixed to said rock shaft, one at each side of the middle of said yoke, adapted to be positively actuated by the yoke in one direction, a crossbar connecting the free ends of said pair of levers, and a spring connecting said crossbar to said yoke for yieldingly actuating said pair of levers in the opposite direction.

10. In a grading machine, a pair of relatively movable detecting rolls, grading means, and adjusting mechanism for adjusting the grading means in response to movements of the detecting rolls, including a normally disengaged ratchet and pawl for preserving in the grading means thinness measurements as determined by the detecting rolls, and a trip member pivoted at one end above the detecting rolls and extending downward and closely following the periphery of the upper roll with its free end and close to the bite of the

detecting rolls on the delivery side thereof, adapted when actuated by the advance end of a blank emerging from the detecting rolls to engage said pawl with said ratchet.

Signed by me at Manchester, New Hampshire, this nineteenth day of December, 1929.

JAMES W. JOHNSTON.