Jan. 2, 1945. A. G. B. METCALF 2,366,205

MACHINE FOR GRADING LEATHER BLANKS

Filed July 30, 1942 6 Sheets-Sheet 1

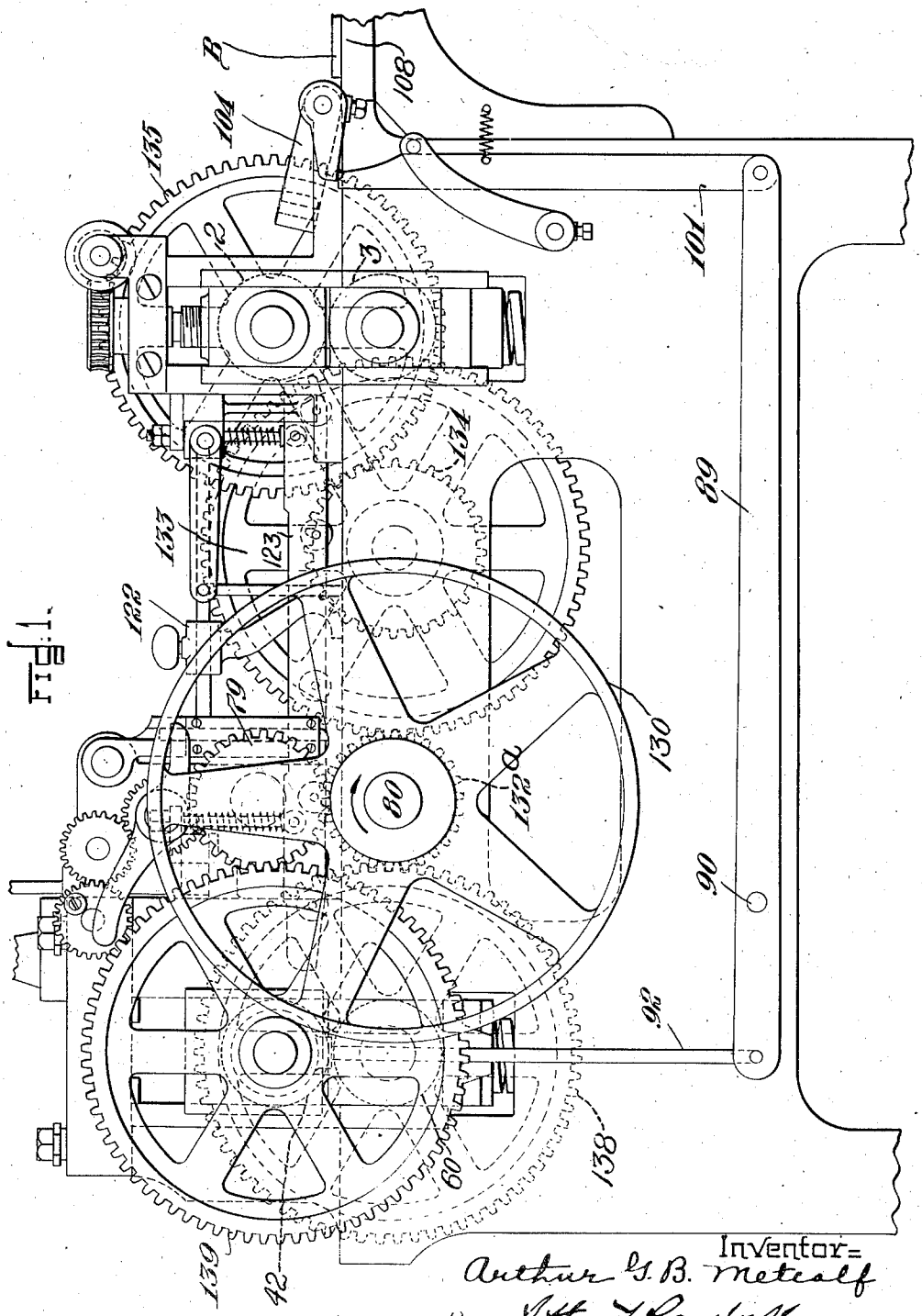


Fig. 1.

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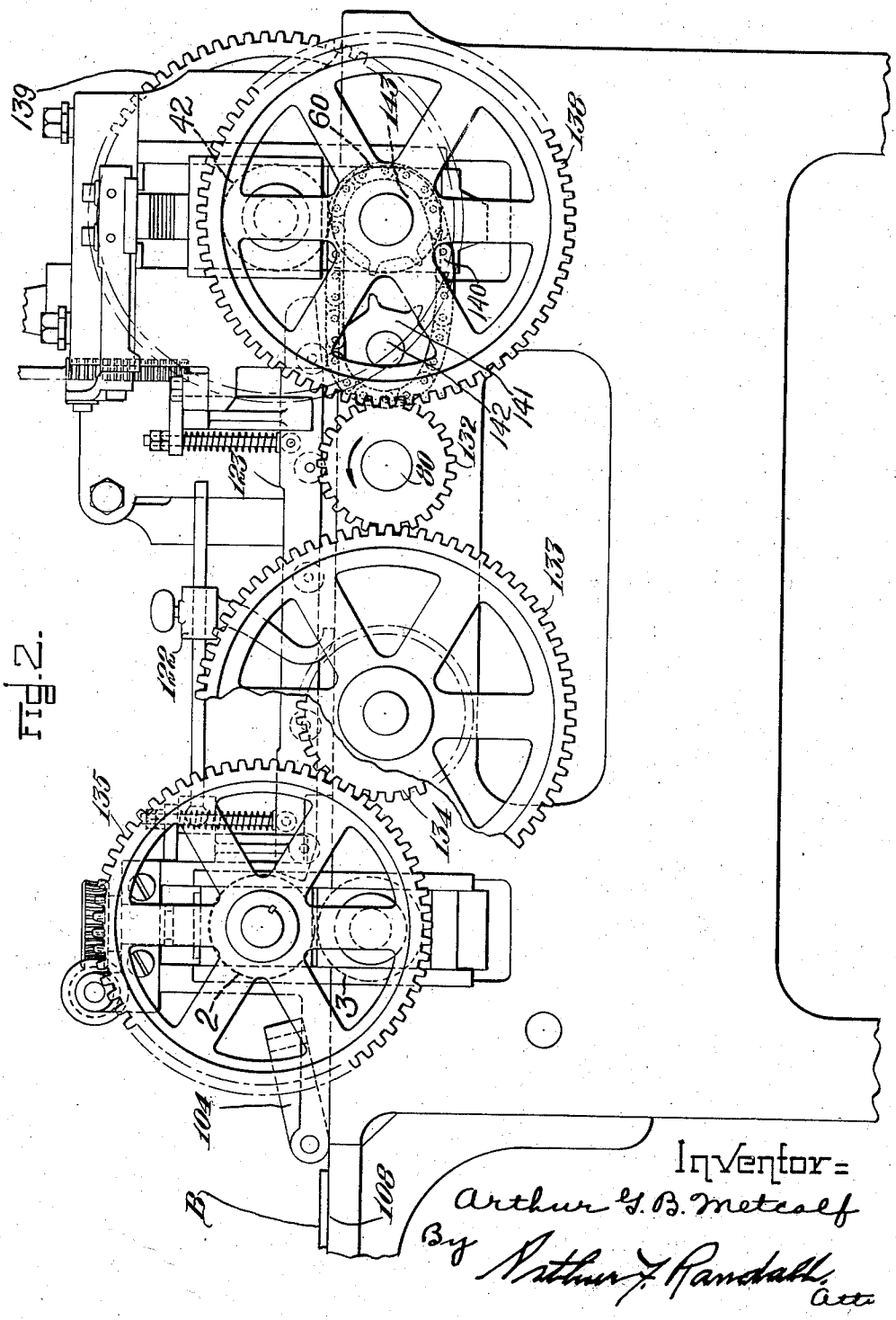


Fig. 2.

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MACHINE FOR GRADING LEATHER BLANKS

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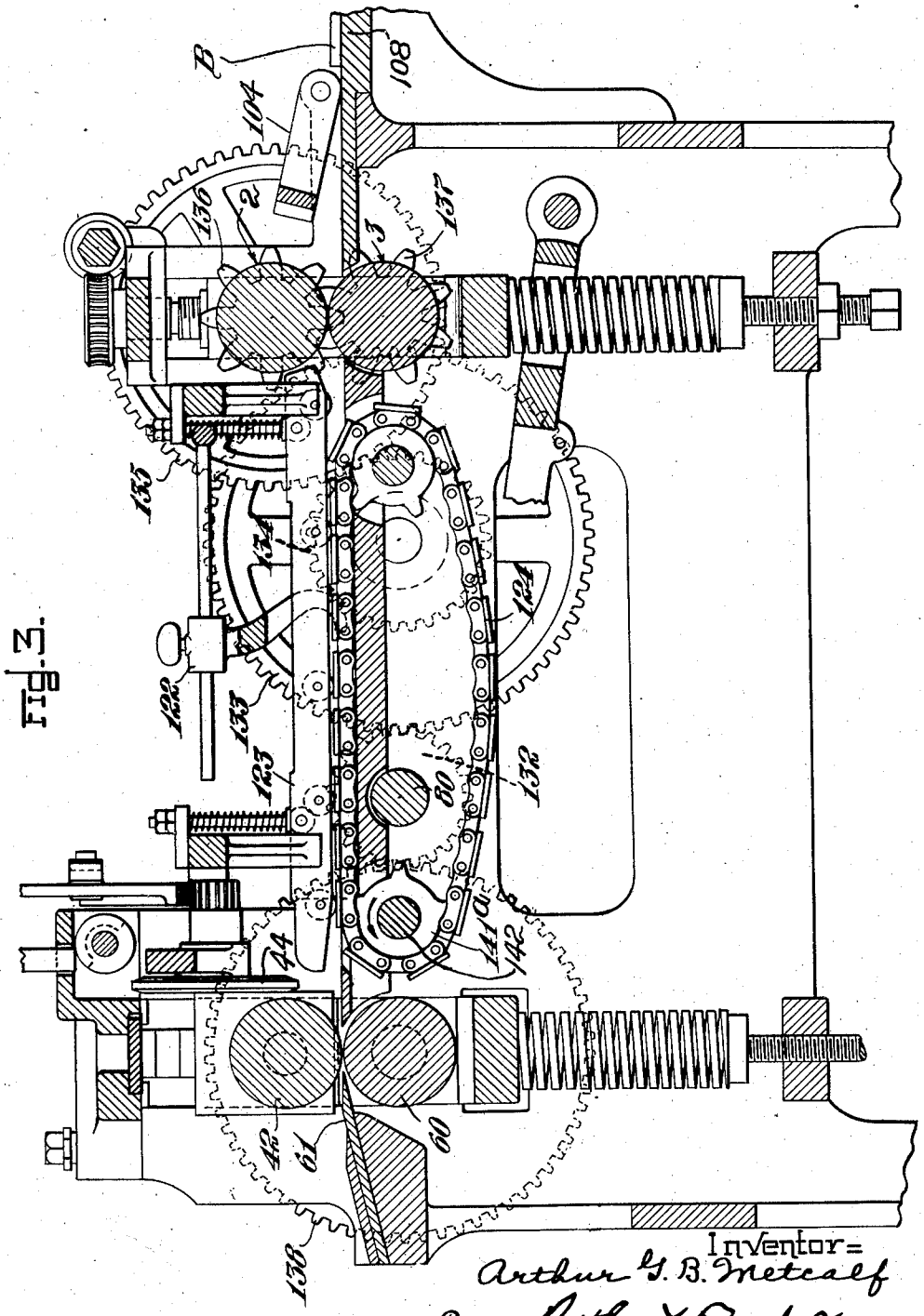


Fig. 3.

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MACHINE FOR GRADING LEATHER BLANKS

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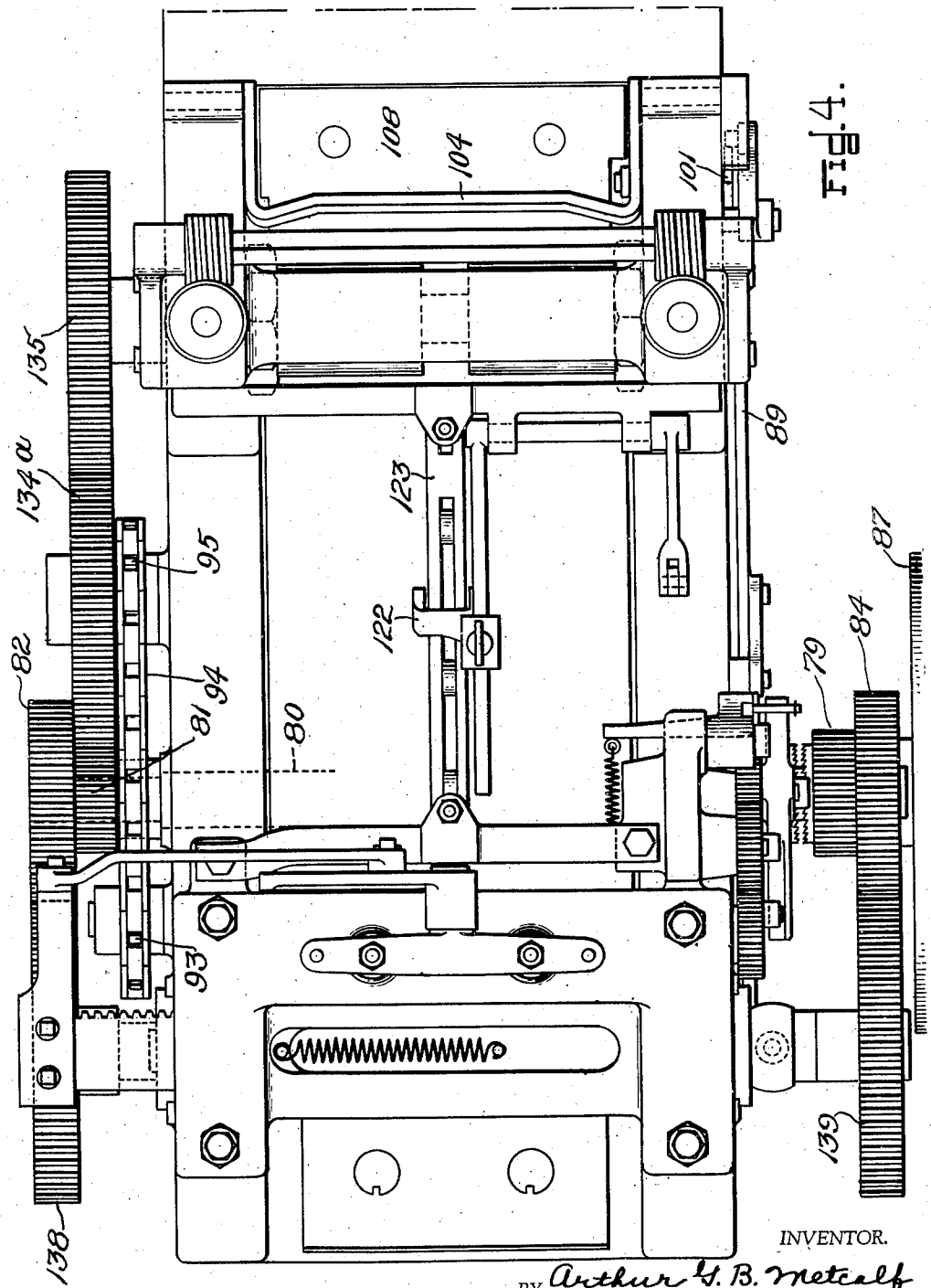


Fig. 4.

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MACHINE FOR GRADING LEATHER BLANKS

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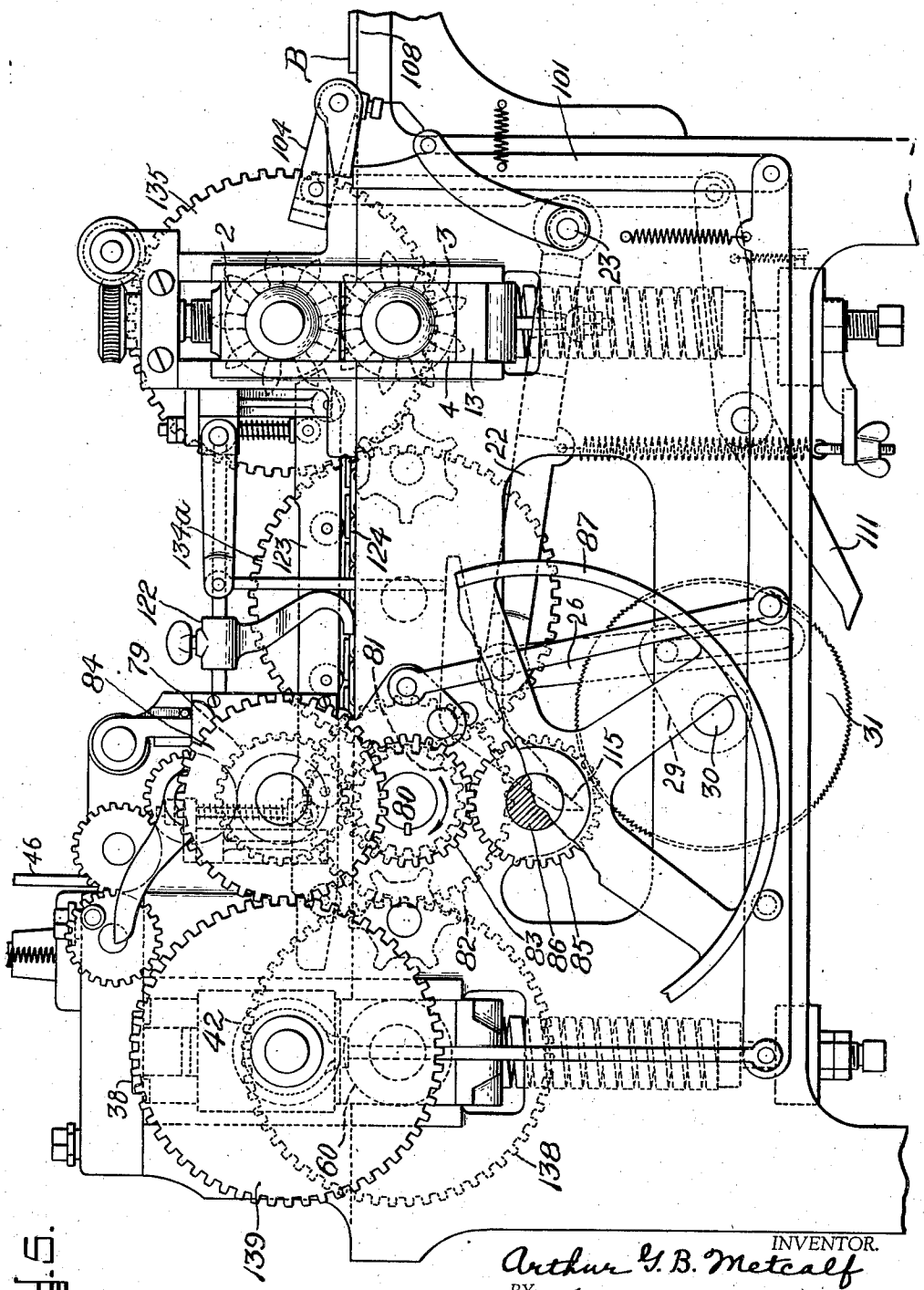


Fig. 5.

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MACHINE FOR GRADING LEATHER BLANKS

Filed July 30, 1942 6 Sheets-Sheet 6

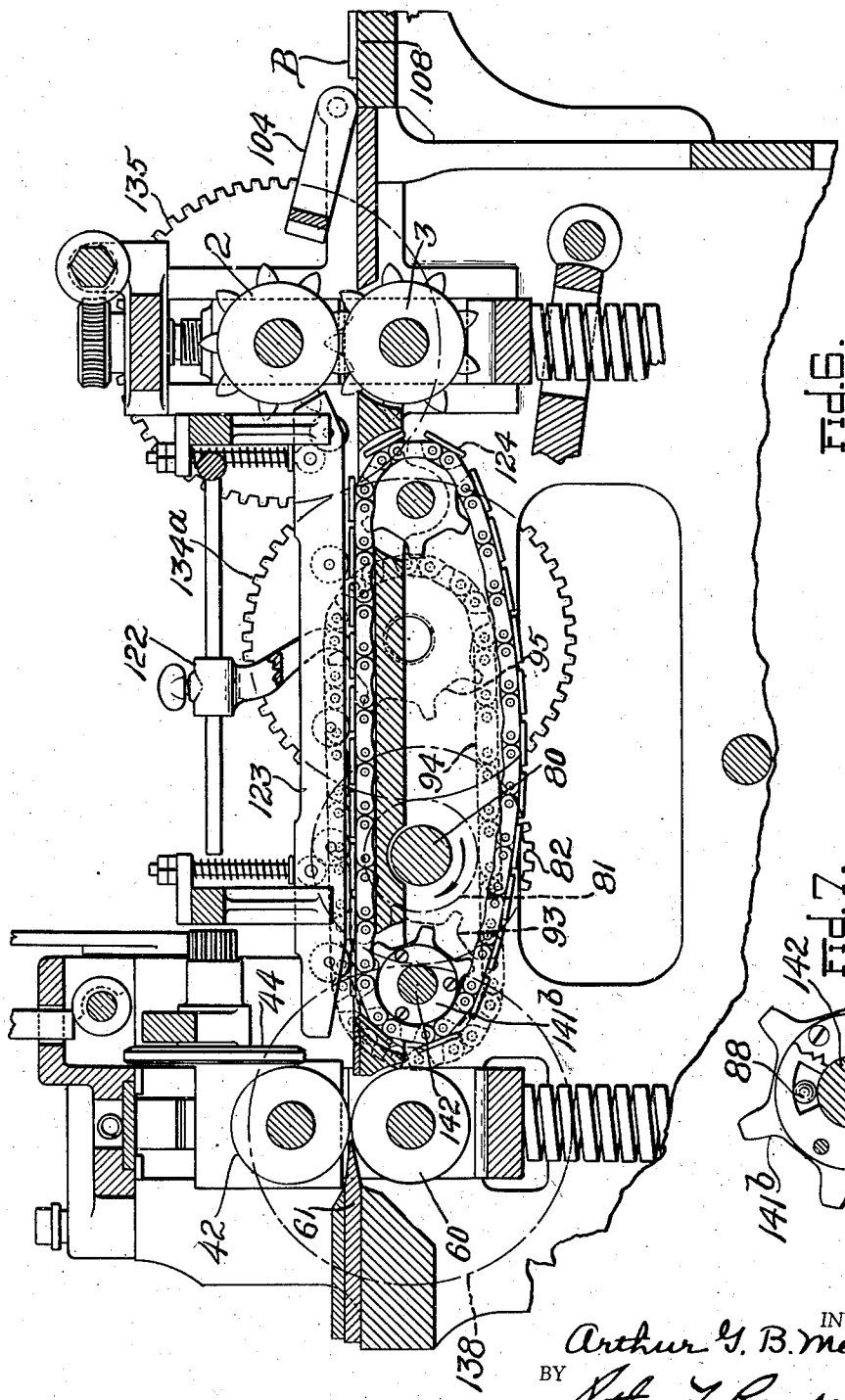


Fig. 6.

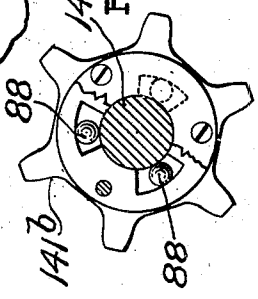


Fig. 7.

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Patented Jan. 2, 1945 2,366,205

UNITED STATES PATENT OFFICE

2,366,205

MACHINE FOR GRADING LEATHER BLANKS

Arthur G. B. Metcalf, Milton, Mass.

Application July 30, 1942, Serial No. 452,931

10 Claims. (Cl. 69—11)

This invention relates to machines for grading died-out pieces or blanks of leather such as shoe soles, taps and the like, as by evening the same in accordance with the thickness of the thinnest part thereof as detected by the measuring mechanism of the machine.

Although not limited thereto, the invention is particularly applicable to the well known Nichols grading machines of the class shown and described in the Nichols Patent No. 1,057,358 and will be described in connection with a machine of this kind.

The present invention has its inception in the discovery that the linear speed at which the measuring of leather or leather blanks can be effectively carried out by a machine of the class referred to cannot be substantially increased beyond a predetermined upper limit peculiar to the measuring mechanism and depending upon the thickness of the blanks being operated upon, without impairing the accuracy of measurement. It has also been discovered that the quality of the skiving or evening performed on the blank and the conditions under which the knife of the machine operates, are greatly improved when the linear speed of the blank while being skived or evened is substantially higher, relatively, than the highest possible linear speed of the blank while it is being measured.

Therefore, for the purpose of increased production and improved skiving or evening effects, the present invention has for its object to provide a grading machine wherein this novel and desirable differential relationship between the linear measuring speed and the linear skiving speed of the leather or leather blank is maintained while the machine is in operation.

To these ends the invention provides an improved method of increasing the rate of production or output of a grading machine of the class referred to and simultaneously effecting a superior product. The invention further provides means operatively associated with the measuring and evening mechanisms of a machine of the class described for establishing and maintaining this novel differential speed relationship between the movement of the blank through the measuring mechanism and its movement through the skiving or evening mechanism. A third feature of the invention provides for movement of the blanks, particularly short blanks, from the measuring mechanism to the evening mechanism of the machine at substantially greater speed than has heretofore been possible, thereby further increasing the output.

In the accompanying drawings:

Figure 1 is a partial side elevation of an evening and grading machine embodying this invention, said machine being of the type shown and described in the Nichols patent referred to above.

Figure 2 is a partial elevation of the machine of Fig. 1 as viewed from the opposite side thereof.

Figure 3 is a central longitudinal sectional view of the machine shown in Figs. 1 and 2.

Figure 4 is a plan view of an evening and grading machine embodying an alternative form of the invention.

Figure 5 is a side elevation of the machine shown in Fig. 4.

Figure 6 is a partial longitudinal sectional view of the machine shown in Figs. 4 and 5.

Figure 7 is a detail hereinafter described.

The illustrated embodiments of the invention are evening and grading machines of the general type shown and described in the Nichols patent referred to above, but before pointing out the novel features thereof it is to be noted that, like the machine of said patent, each embodiment comprises measuring mechanism including a pair of continuously driven measuring rolls 2 and 3; evening or skiving mechanism including a pair of continuously driven feed rolls 42 and 60 with which is associated the usual fixed knife-blade 61; a continuously actuated endless caterpillar chain conveyor 124 by which the blanks are moved from the measuring mechanism to the evening mechanism; the usual spring actuated presser-bar 123 disposed above and cooperatively associated with the chain conveyor 124, and the usual blank-marking mechanism including the marking wheel 44, said evening and marking mechanisms being regulated and set for each blank by the measuring mechanism as usual, and the operation of the marking mechanism being automatically occasioned by the evening mechanism as usual.

Also, each of said two embodiments is provided w tihthe usual "start-measuring" trip mechanism including the blank-operated trip member 122 disposed between the measuring mechanism and the evening mechanism, and with the usual gate 104 controlling the admission of blanks to the machine and also forming part of the "stop-measuring" mechanism of the machine.

The conveyor chain 124 of each machine extends around two sprocket wheels whereof one is continuously driven in a direction to move the top stretch toward the evening mechanism.

In operating a machine of this type the blanks

are slid forwardly one at a time on the usual table 108 and beneath gate 104, either automatically or by hand, so as to cause its forward end to enter between the measuring rolls 2 and 3 after which the movement of each blank through the machine is automatically effected, first by the measuring rolls, then by the conveyor chain and lastly by the feed rolls 42 and 60 by which it is discharged from the machine evened to a thickness nearest to, but not greater than, its thinnest spot as detected by the roll 3, and also embossed with its grade mark.

After being entered between the measuring or calipering rolls 2 and 3, the latter merely propel the blank forwardly until the forward end thereof engages and lifts trip member 122 whereupon the latter acts through the usual devices to throw the "start-measuring" pawl 115 (Fig. 5) into action against ratchet wheel 31 where it remains until trip member 122 drops off from the rear end of the blank. Before this last event, however, the gate 104 drops off from the rear end of the blank and acts through the usual devices to throw the "stop-measuring" pawl 111 (Fig. 5) into action against ratchet wheel 31.

The period of time between the raising of trip member 122 and the fall of gate 104 is the blank-measuring interval during which the lower calipering roll 3 follows the unevennesses of the blank and acts through the usual transmission including ratchet wheel 31, to set the evening mechanism and adjust marking wheel 44 in accordance with the thickness of the thinnest spot detected by roll 3 preparatory to the entrance of the blank between the feed rolls 42 and 60.

Thus, when the blank enters and passes between the fed rolls 42 and 60 the upward displacement of roll 42 is automatically limited by, and proportionate to, the thickness of the thinnest spot as detected by the measuring mechanism, while the thicker parts of the blank will slightly depress the lower feed roll 60, the portion of the blank between the cutting edge of blade 61 and the bottom of roll 42 being the evened blank which passes over blade 61 and the portion of the blank below said cutting edge being the removed shim or skiving, usually quite thin, which passes below the blade.

It is to be noted that when operating a machine of this kind the gate 104 is held in its closed position to prevent the entrance of the next successive blank into the machine until the rear or trailing end of the preceding blank passes out from between the feed rolls 42 and 60 thereby permitting the upper feed roll 42 to drop and act through the usual connections 92, 89 and 101 (Figs. 1 and 5) to open gate 104.

It is therefore evident that the rate of production of the machine, or the rate at which evened blanks can be discharged from the machine, is proportional to the length of time measured by the passage of each blank from the rolls 2 and 3 to and through the feed rolls 42 and 60.

In machines of the Nichols class herein disclosed all four rolls 2—3 and 42—60 are usually of the same size, viz., about two and three-sixteenths inches in diameter and owing mainly to the inertia of the parts of the transmission connecting the lower feeler roll 3 with the evening mechanism and with the marking wheel, it is only possible in machines of this class, to drive the measuring rolls 2 and 3 at a comparatively slow maximum blank-propelling speed of from 100 to 125 revolutions per minute depending upon the thickness of the blanks being operated upon. So far as I know it has heretofore always been the practice to construct such machines so that the conveyor chain 124 and feed rolls 42—60 were driven at the same blank-propelling speed as that of the measuring rolls 2 and 3. This occasioned a corresponding lag in production because of the comparatively slow movement of the blanks away from the measuring rolls and past knife-blade 61.

It is to be understood that the transmission mechanism referred to above is incorporated in both forms of the invention herein shown and that said mechanism is constructed as shown and described in said Nichols patent, said mechanism including the journal bearings 4 of roll 3 (Fig. 5), yoke 13, lever 22, arm 26, rocker arm 29, shaft 30 and the parts (not herein shown) which connect shaft 30 with the slide 38 of the evening mechanism and with the wheel 44 of the marking mechanism but which are shown in Fig. 4 of the Nichols patent as including the elements 32, 33, 35, 36, 37, 38 and 46.

It is a purpose of this invention to provide means whereby this production lag may be made substantially and desirably less than heretofore while at the same time retaining the necessarily relatively slow blank-propelling speed of the measuring rolls, and it is also a purpose of this invention simultaneously to improve both the skiving effects produced by the knife-blade and the conditions under which the latter operates.

In the embodiment of this invention illustrated in Figs. 1, 2 and 3 of the drawings the upper roll 2 of the measuring mechanism is provided with a gear 135 which is driven by an intermediate gear 134 rotatably supported by a stud shaft projecting from the frame of the machine. Gear 134 is compounded with a larger intermediate gear 133 which is driven by a gear 132 fast on the main shaft 80 of the machine at one side of the latter. The ratio between the gears 134 and 135, as shown, is 2:1. Fast on main shaft 80 at the opposite side of the machine is a gear 132*a* (Fig. 1) acting through an intermediate gear 79 to drive a gear 139 provided on the upper feed roll 42. The lower feed roll 60 is provided with a gear 138 driven by the gear 132 (Fig. 2). The pitch diameters of the gears 132, 132*a* and 79 are alike and the pitch diameters of the gears 133, 138 and 139 are also alike. It will therefore be clear that the three gears 133, 138 and 139 are driven at one speed and that because of the ratio between the gears 134 and 135 the feed rolls 42 and 60 are driven at twice the speed of the measuring rolls 2 and 3. Also, it will be clear that if the pair of rolls 2 and 3 are driven at the same speed as heretofore as herein contemplated, then the feed rolls 42 and 60 will be driven twice as fast as heretofore and twice as fast as the rolls 2 and 3. In this way each blank is propelled between the feed rolls 42 and 60 of the evening mechanism at double the speed of the measuring rolls which not only results in a substantial saving of time but also improves both the cutting effects and the conditions under which the knife operates.

The shaft of the lower feed roll 60 of the evening mechanism carries the usual sprocket 143 (Fig. 2) connected by a chain 140 with a sprocket 141 fast on the shaft 142 on which is fixedly mounted the usual chain-actuating sprocket 141*a* (Fig. 3). The pitch diameters of these three sprockets are such that the chain 124 is driven at the same speed as the surface speed of the feed

rolls 42—60. Therefore, since both feed rolls of the evening mechanism are driven at double their former speed, the same is true of the chain conveyor 124. Consequently, the conveyor chain advances each blank from the measuring mechanism to the evening mechanism at double its former speed thus accomplishing a further saving of time.

It is to be noted that while the blank is passing between the measuring rolls 2 and 3 with its forward end portion between presser bar 123 and conveyor chain 124, the engagement of the latter with the blank is frictional in character and so long as the blank is engaged by the measuring rolls the latter grip said blank much more forcibly than is the case with the presser bar and chain. Therefore the blank speed will be that of the measuring rolls and the faster moving chain conveyor will, by reason of its relatively lower frictional engagement with the blank, slip relatively thereto and be ineffective to impart its velocity to the latter. Just as soon as the after portion of the blank clears the measuring rolls, its speed instantly becomes that of the chain conveyor which is at that moment the only propelling element in engagement with the blank.

The blank progresses with this increased velocity to and between the feed rolls 42 and 60 which force the same past the knife 61 and discharge it from the machine, the peripheral velocities of said feed rolls being the same as the chain speed.

As the blank enters between the feed rolls of the evening mechanism it lifts the upper roll 42 to the limit predetermined for it by the measuring mechanism, while the lower feed roll 60 is immediately thereafter depressed against the pressure of its supporting springs to the extent of the thickness of the shim that is removed from the blank by the knife.

As the evened blank is discharged from the machine by the feed rolls of the evening mechanism the upper roll 42 falls into its normal lowermost position and acts through the connections 92, 89 and 101 (Fig. 1) to swing gate 104 upwardly into its open position shown in the drawings where it remains until the next blank is fed into position between the measuring rolls whereupon the depression of the lower roll 3 trips the push bar 101 thereby permitting the gate to fall into position upon the entering blank.

In the embodiment of the invention illustrated in Figs. 4 to 7, inclusive, the upper measuring roll 2 is provided with a gear 135 (Figs. 4 and 6) that is driven by an intermediate gear 134*a* which in turn is driven by a gear 81 fast on the main drive shaft 80. As shown, the pitch diameters of the two gears 135 and 134*a* are both six inches, while the pitch diameter of the main shaft gear 81 is two inches. Thus three revolutions of the main shaft 80 imparts one revolution to the upper measuring roll 2.

Also fast on the main shaft 80 is a four inch gear 82 which drives a six inch gear 138 fast on the shaft of the lower feed roll 60 of the evening mechanism, this ratio of the gears providing for two revolutions of gear 138 for each three revolutions of main shaft 80 and gear 82.

A third gear 83 (Figs. 4 and 5) fast on the main shaft 80 drives an intermediate gear 79 that is compounded with a second four inch intermediate gear 84 which, in turn, drives a six inch gear 139 carried by the upper feed roll 42 of the evening mechanism. The compounded intermediates 79 and 84 are rotatably supported by a stud shaft projecting from the frame of the machine and the gear 79 is of the same size as its driving gear 83. It will thus be clear that the upper feed roll 42 of the evening mechanism is also rotated twice for each three revolutions of the main drive shaft 80. In this way the feed rolls of the evening mechanism are rotated twice for each revolution of the measuring rolls 2 and 3. Since the measuring rolls and the feed rolls are all of one size it will be clear that the blank-propelling effects of the latter are twice that of the former as is the case with the form of this invention illustrated in Figs. 1, 2 and 3 of the drawings.

The main shaft gear 83 (Fig. 5) is driven by a gear 85 fast on a prime power shaft 86 provided with tight and loose pulleys whereof one is shown at 87.

In this form of the invention the chain-operating sprocket 141*b* (Figs. 6 and 7) has its hub constructed with over-running clutch means 88 through which the shaft 142 normally drives said sprocket at the same blank-propelling speed as that of measuring rolls 2 and 3 but with provision for accelerated forward movement of the sprocket 141*b* independently of shaft 142 as presently pointed out. At its one end the shaft 142 carries a sprocket 93 (Figs. 4 and 6) connected by a chain 94 with a sprocket 95 that is compounded with the intermediate gear 134*a*, said two sprockets being of the same size. Thus, when the blank clears the measuring rolls 2 and 3 it is transported to the rolls 42—60 of the evening mechanism by the conveyor chain 124 at the same speed as that of the measuring rolls but immediately upon entrance of the forward or leading end of the blank between the rolls 42—60 of the evening mechanism which are being driven at twice the speed of the measuring rolls and chain, the over-running clutch means of sprocket 141*b* permits the chain 124 and sprocket 141*b* to move with the accelerated blank at twice their normal speeds.

Each blank passed through this machine of Figs. 4, 5 and 6 is first fed forward by the measuring rolls 2 and 3 at a relatively slow speed until its forward end enters between chain 124 and spring-pressed shoe 123; then for a period of time, at the same relatively slow speed, by rolls 2 and 3 and chain 124 acting together upon the blank without slippage of the chain relatively to the blank as with the form of the invention shown in Figs. 1, 2 and 3; then as soon as the rear end of the blank clears the rolls 2 and 3, by chain 124 alone at the same relatively slow speed as it is transferred from the measuring rolls to the evening rolls; then by feed rolls 42—60 at twice its original speed for a period of time during which the over-running clutch 88 (Figs. 6 and 7) permits the chain 124 to race ahead with the blank without slipping relatively thereto, and lastly, by feed rolls 42—60 alone by which the blank is carried past the knife and discharged from the machine, the over-running clutch 88 permitting the shaft 142 to resume its drive of the chain at said original, or normal, relatively slow speed as soon as the rear end of the blank cleared said chain.

The above described novel constructions and modes of operation materially and desirably reduce the time consumed in passing each blank through the machine so that the successive blanks are fed into the machine more rapidly than heretofore.

By advancing the blank through the evening mechanism at double the speed formely employed, the present invention effects a decided improvement in the quality of skiving performed on the

blanks and, in addition, substantially increases the output of the machine as compared to the production rate of former machines of this class; at the same time, the improved machine retains the same high quality measuring characteristics which can only be accomplished when the measuring mechanism is operated at relatively low speed.

What I claim is:

1. A leather grading machine of the class described having means for advancing each blank through the fields of action of the measuring mechanism and of the grading mechanism thereof, respectively, said blank-advancing means being operable to move each blank through the grading field at a substantially higher linear speed than it moves the blank through the measuring field.

2. A leather grading machine of the class described having means for advancing each blank through the fields of action of the measuring mechanism and of the evening mechanism thereof, respectively, said blank-advancing means being operable to move each blank through the evening field at a substantially higher speed than it moves the blank through the measuring field.

3. A leather grading machine of the class described having means for advancing each blank through the fields of action of the measuring mechanism and of the evening mechanism thereof, respectively, said blank-advancing means being operable to move the blank through the evening field at a substantially higher linear speed than it moves the blank through the measuring field; conveyor means for advancing each blank from the field of action of the measuring mechanism to the field of action of the evening mechanism, and means for driving said conveyor means so that it imparts a relatively greater speed to each blank then the latter has while passing through the measuring field.

4. A grading machine of the class described having means for driving the evening mechanism thereof at a substantially greater blank-propelling speed than the blank-propelling speed of the measuring mechanism thereof.

5. A grading machine of the class described having means for driving the measuring and evening mechanisms thereof so that the evening mechanism is operated at a substantially greater blank-propelling speed than the blank-propelling speed of said measuring mechanism; an endless conveyor disposed between said mechanisms for delivering each measured blank to said evening mechanism, and means for driving said conveyor at a substantially greater blank-propelling speed than the blank-propelling speed of said measuring mechanism.

6. A grading machine of the class described having means for driving the measuring and grading mechanisms of said machine so that the grading mechanism is operated at a substantially greater blank-propelling speed than the blank-propelling speed of said measuring mechanism; an endless conveyor disposed between said mechanisms for delivering each measured blank to said grading mechanism and means for driving said conveyor at a slower blank-propelling speed than the blank-propelling speed of said grading mechanism, said conveyor-driving means being constructed to permit acceleration of the speed of said conveyor by each blank while the latter is being propelled by the grading mechanism and is in engagement with said conveyor.

7. A grading machine of the class described having means for driving the measuring and grading mechanisms thereof so that the grading mechanism is operated at a substantially greater blank-propelling speed than the blank-propelling speed of said measuring mechanism; an endless conveyor disposed between said mechanisms for delivering each measured blank to said grading mechanism, and means for driving said conveyor at a slower blank-propelling speed than the blank-propelling speed of said grading mechanism, said conveyor-driving means including an over-running clutch for permitting acceleration of the speed of said conveyor by each blank while the latter is being propelled by the grading mechanism and said blank is in engagement with said conveyor.

8. A grading machine of the class described having means for operating the measuring and grading mechanisms thereof; an endless conveyor disposed between said mechanisms for delivering each measured blank to said grading mechanism, and means for driving said conveyor at a substantially greater blank-propelling speed than the blank-propelling speed of said measuring mechanism.

9. A grading machine of the class described having a continuously rotating main shaft; measuring mechanism including a pair of calipering rolls; grading mechanism including a pair of feed rolls; mechanism through which the main shaft continuously drives said calipering rolls of the measuring mechanism at a relatively low speed, and mechanism through which said main shaft continuously drives the feed rolls of the grading mechanism at a blank-propelling speed that is substantially greater than the blank-propelling speed of said calipering rolls.

10. The combination of claim 9 and wherein an endless conveyor is provided between said measuring and grading mechanisms for delivering each measured blank to said grading mechanism, and wherein means is provided for driving said conveyor at a substantially greater blank-propelling speed than the blank-propelling speed of said caliphering rolls.

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