N. DE LONG.

STAY GRINDING MACHINE.

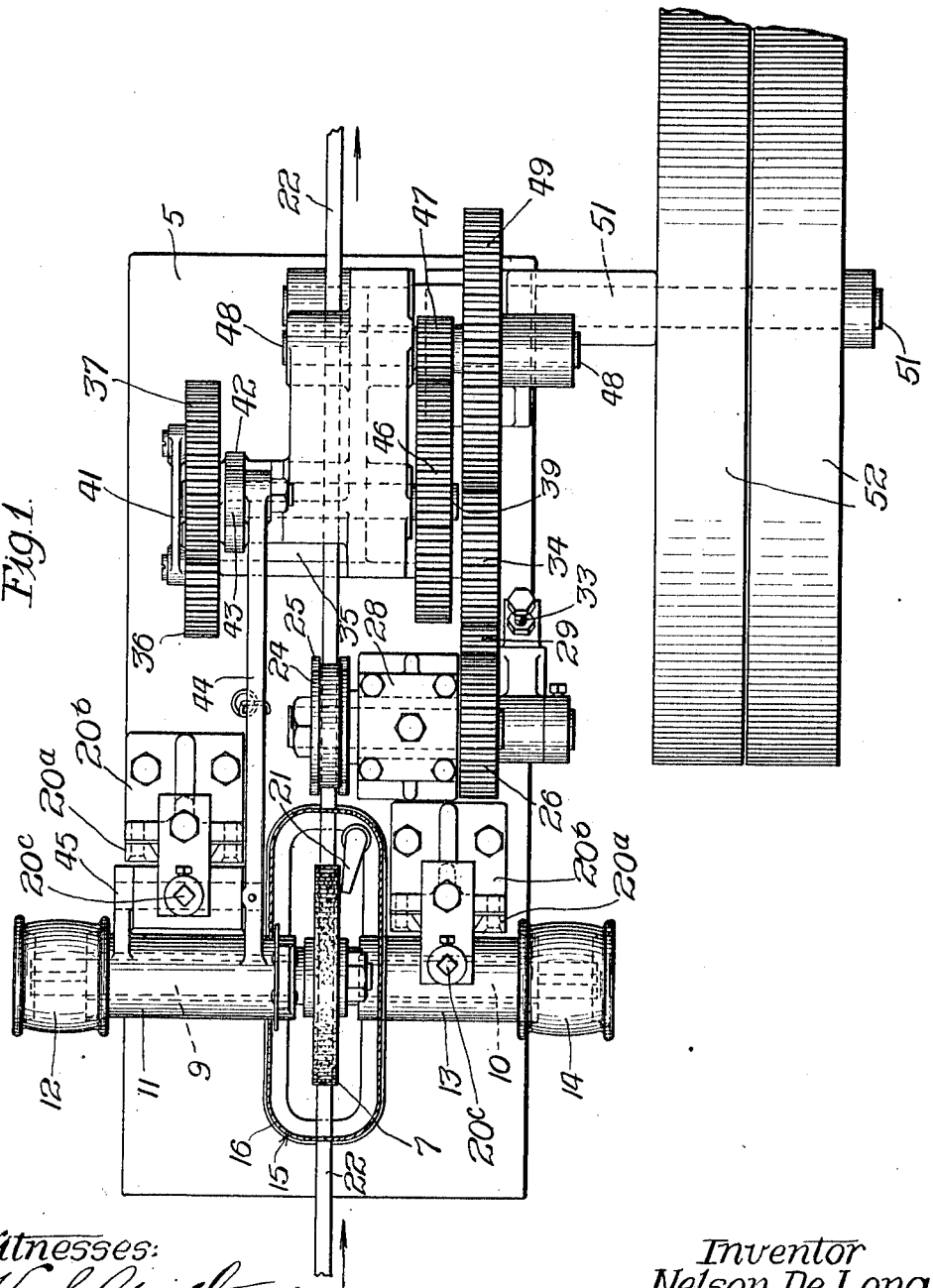
APPLICATION FILED FEB. 5, 1914.

1,102,211.

Patented June 30, 1914.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 4.

Fig. 2.

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3 SHEETS—SHEET 3.

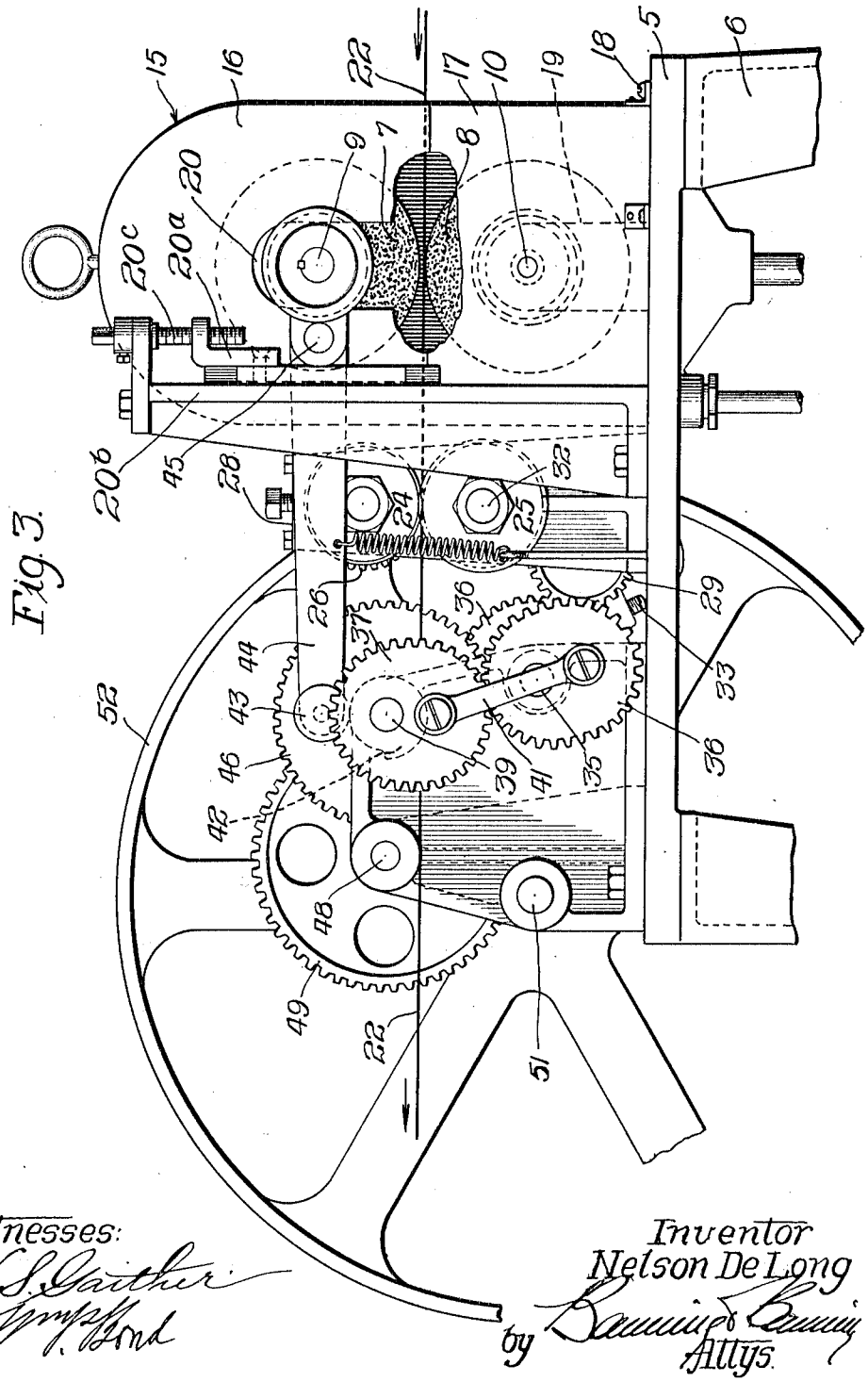

Fig 3.

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STAY-GRINDING MACHINE.

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Application filed February 5, 1914. Serial No. 816,802.

To all whom it may concern:

Be it known that I, NELSON DE LONG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Stay-Grinding Machines, of which the following is a specification.

The present invention relates to a machine for grinding strips of spring steel metal at intervals for the purpose of ultimately producing corset stays with a tapered end thereon.

The objects of the present invention are to provide a machine in which the work will be continuously fed in the same direction, to provide means for periodically bringing about an operative engagement between the grinding means and the work, and allowing such engagement to be maintained until a desired distance is ground.

A further object of the invention is to provide means whereby the degree of operative engagement between the grinding means and the work will change during the period in which the grinding means and work are in operative engagement.

A further object of the invention is to so arrange the means for feeding the work as to have it fed faster during the period when no grinding is being performed than during the period when the grinding is being performed.

A further object of the invention lies in so arranging the train of gears which drive the feed rolls of the mechanism as to enable the ratio of size between these gears to be readily changed to change the speed of the feed roll and produce different lengths of stays.

The invention further consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings: Figure 1 is a plan view of the mechanism of the present invention; Fig. 2 is a side elevation; Fig. 3 is a side elevation looking upon the opposite side from that shown in Fig. 2; and Fig. 4 is an edge view of a strip of work after it has been subjected to the grinding operation, with the thickness of the work and the depth of the grinding exaggerated.

As stated, this machine relates to a mechanism for producing the tapered end on a corset stay. In certain types of corsets it is desirable to employ a stay in which the end is thin and of a flexible nature, and the machine of the present invention is designed with a view of thinning or grinding away the work at periodical intervals whereby when this strip of material is severed into sections, stays having a tapered end will be produced.

Referring to the drawings, and particularly to Figs. 1 and 2, the mechanism is mounted upon a table 5 supported by suitable under framing 6. An upper grinding member 7 and a lower grinding member 8 are provided each of which in the construction shown is in the nature of a disk of abrasive material. The upper disk 7 is mounted upon a shaft 9, and the lower disk 8 on a shaft 10. The shaft 9 extends through a sleeve 11 and has connected to its end a pulley 12. The shaft 10 extends through a sleeve 13 and has connected to its end a pulley 14 (see Fig. 1). Both of these pulleys are connected by suitable belts, not shown, to any suitable source of power.

The grinding members 7 and 8 are inclosed within a housing 15 formed of an upper section 16 and a lower section 17 and the upper section 16 is designed to be readily removable from the lower section 17 after the manner of a cap. The lower section 17 is held in place by suitable removable fastening means 18, whereby if it becomes necessary this lower section can be readily removed from position, but in practice this lower section of the housing would probably be removed but a relatively few times. The lower section is cut away to provide a slot 19 in which the sleeve 13 lies. This slot is provided to allow the shaft 10 to be adjusted as the disk wears. The upper section is cut away to provide a slot 20 in which lies the sleeve 9, which slot is for the same purpose as the slot 19, namely, to allow the upper disk to be adjusted and suitable means are provided for each disk, as a member 20^a sliding in the guide 20^b and actuated by the threaded stem 20^c to effect such adjustment of the disks. A nozzle 21 is provided for the purpose of projecting water at the point where the grinders engage the work. The function of the casing previously described being to prevent the splashing of water and sediment during the grinding operation.

The work which is being acted upon is in

the form of an elongated strip of spring steel 22 of a character practical for use as corset stays. This strip is unwound from one reel and wound onto another during the operation of the machine, the reels upon which it is wound and from which it is unwound not being shown. Suitable slots 23 are provided in the housing through which the work passes. The work is moved in the direction of the arrows as indicated in the drawings, and is advanced through the instrumentalities of suitable feeding means, which in the construction shown consists of an upper feed roll 24 and a lower feed roll 25.

The upper feed roll is connected to a gear 26 and the lower feed roll is connected to a gear 27. The upper feed rolls being capable of adjustment within a suitable journal box 28. The gear 27 of the lower of the feed rolls meshes with an idler gear 29. Said gear being mounted upon a stud 30 secured in an arm 31 which is mounted to swing about the shaft 32 of the lower feed roll 25, and suitable means are provided for moving this gear into different positions as for instance a set screw 33 bearing against the table, it is obvious as the set screw 33 is turned it will swing the arm 31 and gear 29 about the shaft 32 as a center of movement.

A gear 34 meshes with the gear 29, and this gear may be termed the removable gear and is positioned upon its shaft 35 in such a manner as to be readily removable therefrom to permit of the easy removal of one gear and the installation of another gear thereon. As heretofore explained, the gear 29 is shiftable, so it can be moved to accommodate itself to the size of gear that may be placed upon the shaft 35. Now by changing the size of the gear on the shaft 35 the ratio between the gears 29 and 34 will be changed, and hence the feed rolls will be driven at a speed determined by the size of the gear 34. This feature is incorporated in the mechanism so that in case it is desired to grind a short stay the feed may be slower than in the cases where it is desired to grind a long stay, as will be seen hereinafter the grinding means are brought in engagement with the work at periodical intervals, and of course the speed of movement of the work through the machine determines the distance apart which the ground surfaces will be placed and hence will determine the length of the stay since a ground surface occurs at a terminus of each stay.

As heretofore stated, it is desired to move the work slower while the grinding action is being performed than when no grinding action is taking place. This I accomplish by employing a set of elliptical gears, one of which is numbered 36 in the drawing and the other of which is numbered 37. The center of movement of the gear 36 is the shaft 35 and the center of movement of the elliptical gear 37 is a shaft 39. A link 41 is connected to these gears, the function of which is to tie the gears together thereby aiding continuous relative movement between them. It will, therefore, be seen that the shaft 35 is driven through the instrumentality and by the operation of these elliptical gears and as is well known in the field of mechanics a drive embodying a pair of gears of this sort will operate the driven shaft at a changing rate of speed, that is for one portion of the revolution of the driven gear it will be running relatively fast and for another portion relatively slow while the speed of rotation during that part of the revolution between the extreme fast and extreme slow movement will gradually increase or decrease according as whether the movement is changing from fast to slow or from slow to fast.

During the period when the grinding members are in action that portion of the gear 37 which lies closest to the shaft 39 which may be termed the low portion, will be in engagement with that portion of the gear 36 which lies farthest from the shaft 35, which may be termed the high portion, the effect will be the same as though there were a small gear on the shaft 39, driving onto a large gear on the shaft 35, and the effect will be to turn the latter shaft slowly which will result in a relatively slow movement of the feed rolls. When, however, the grinding means are out of operative position with respect to the work the high part of the gear 37 will be in engagement with the low part of the gear 36. This will have the effect of a large gear on the shaft 39 driving a small gear on the shaft 35, the effect of which will be to turn the shaft 35 faster with the result that the feed rolls are actuated faster and the work fed with a relatively fast movement. A cam 42 is also located on the shaft 39 which cam engages with a roller 43 on an arm 44, this arm moves about a pin or stud shaft 45 as a center of movement, and the arm is connected as shown perhaps more clearly in Fig. 1 to the sleeve 11 through which the shaft 9 of the upper grinding member 7 passes. Obviously as this arm is rocked up and down through the instrumentalities of the cam it will raise and lower the upper grinding disk 7. When this grinding disk is lowered it engages the work and brings about an operative engagement between the upper and lower grinding members, the upper side of the work being ground by the upper grinding member and the lower side by the lower grinding member.

As shown in the drawings, the position of the cam is such as to bring the upper grinding disk first into engagement with the work

to effect the deepest cut and then to gradually allow the arm 44 to move so that the upper grinding member is gradually moved to gradually decrease the depth of the cut until finally the grinding member is brought entirely out of engagement with the work. Of course the grinding member does not entirely disengage from the work until the work has advanced a predetermined distance, but as the work advances the degree of engagement between the grinding member and the work is growing constantly less, hence the effect of the action of the grinding member on the surface of the work is constantly and gradually less. This produces the tapered grinding in the body of the work as will be apparent from a study of Fig. 4 of the drawings. It might be stated at this point that I contemplate a reverse arrangement of the cam whereby the cut produced in the work will be brought about by the grinding members first engaging the work lightly and gradually increasing the degree of engagement till the point of lowest cut is reached and then making a disengagement from the work. After the grinding member has been moved away from the work a predetermined distance it will, of course, cease to have any effect so far as respects a grinding of the surface of the work, and the work will pass between the grinding members without any grinding action being exerted thereon and will pass along for a predetermined distance and then the upper grinding disk will again act to bring about an engagement between the work and grinding means with the result that another tapering cut is made in the work as previously explained.

As has been stated, the work will move faster when no grinding is being performed, than when it is, since of necessity it must move slow during the grinding operation in order that the grinding members may have time to perform their function, and furthermore the proportion of the surface which it is desired to grind is materially smaller than the proportion of the surface which it is desired to be left unground and since the grinding members move into engagement with the work at regular intervals obviously the work must be moved faster while the grinding members are out of engagement in order that the proper proportion of unground surface may be obtained. A gear 46 is provided which is mounted on the shaft 39 and this gear meshes with a pinion 47 on a shaft 48 to which latter shaft is secured a gear 49 which meshes with a pinion 50 on a main driving shaft 51 to which power is applied by any suitable means.

The shaft 51 is equipped with pulleys 52 over which pass belts from any suitable source of power now shown. The transmission of power therefore is from the pinion 50 to the gear 49 to the pinion 47, to the gear 46 to the shaft 39, and from there to the cam 42 to raise and lower the upper grinding member, and from the shaft 39 to the elliptical gear 37 to the elliptical gear 36, to the shaft 35 to the gear 34 to the gear 29 to the gear 27 to drive the lower feed roll 25, and to the gear 26 to drive the upper feed roll 24, it will be observed that the operation of grinding the tapered surfaces occurs at periodical intervals and that the work moves along through the machine continuously and in the same direction. After the work has been ground in the manner above described the strip or band of steel is then cut into stay lengths at or near the point where the work is ground to the minimum or maximum thickness.

When the term "disk" is herein used it refers to a member in the shape of a section of a cylinder as differentiated from a disk having a pointed or tapered periphery.

I claim:

1. In a machine of the class described, the combination of means for continuously feeding the work in one direction, grinding means, means operatively connected for bringing about an operative engagement between the grinding means and work at periodical intervals and continuing such engagement until a desired distance is ground and said feeding means operating to advance the work less rapidly during the period of action of said grinding means than during the period of non-action of said means, substantially as described.

2. In a machine of the class described, the combination of means for continuously feeding the work in one direction, grinding means, means operatively connected for bringing about an operative engagement between the grinding means and work at periodical intervals and continuing such engagement until a desired distance is ground, the degree of engagement of said grinding means with the work changing during such distance whereby a tapered cut is produced and said feeding means operating to advance the work less rapidly during the period of action of said grinding means than during the period of non-action of said means, substantially as described.

3. In a machine of the class described, the combination of means for continuously feeding the work in one direction, an upper grinding member, a lower grinding member and means operatively connected to move one of said grinding members into and out of engagement with the work whereby at periodical intervals an operative engagement is brought about between the grinding member and work which engagement continues until a desired distance is ground, substantially as described.

4. In a machine of the class described, the combination of feed rolls, means for actuating said feed rolls to move the work continuously in one direction, consisting of a train of gears embodying an idler gear and a removable gear meshing with the idler gear, whereby the ratio between such gears may be changed to change the speed of rotation of the feed rolls, grinding means, and means for bringing about an operative engagement between the grinding means and work at periodical intervals, and continuing such engagement until a desired distance is ground.

5. In a machine of the class described, the combination of means for feeding a strip of work in one direction only, grinding means, means for bringing about an operative engagement between the grinding means and work at intervals and continue such engagement until a desired distance is ground, and means for changing the length of work between said ground portions to produce different lengths of stays.

6. In a machine of the class described, the combination of means for feeding a strip of work in one direction only, grinding means, means for bringing about an operative engagement between the grinding means and work at intervals and continuing such engagement until a desired distance is ground, and means for adjusting the speed of movement of the feeding means, whereby the length of work between the ground surfaces is changed and different lengths of stays produced, substantially as described.

7. In a machine of the class described, the combination of means for feeding a strip of work in one direction, means operatively connected and including a train of gears for actuating said feeding means, grinding means, means for bringing about an operative engagement between the grinding means and work at intervals and continuing such engagement until a desired distance is ground, and means for changing the ratio between selected gears of the train of gears to adjust the speed of movement of said feeding means, whereby the length of work between the ground surfaces is changed and stays of different lengths produced, substantially as described.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."