F. HARDINGE.

APRON MECHANISM FOR LATHES.

APPLICATION FILED SEPT. 4, 1917.

1,282,821.

Patented Oct. 29, 1918.

3 SHEETS—SHEET 1.

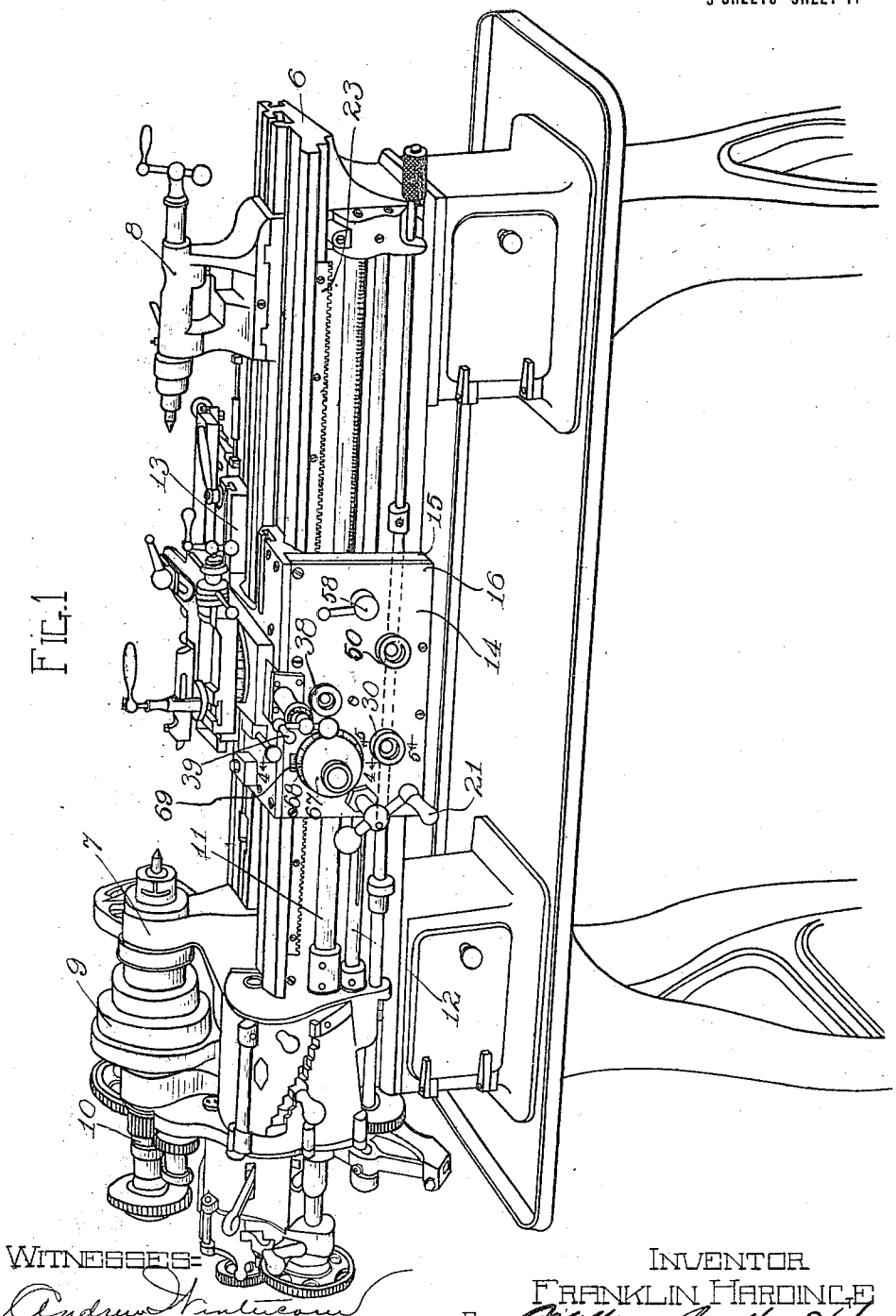


FIG. 1

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3 SHEETS—SHEET 2.

FIG. 3

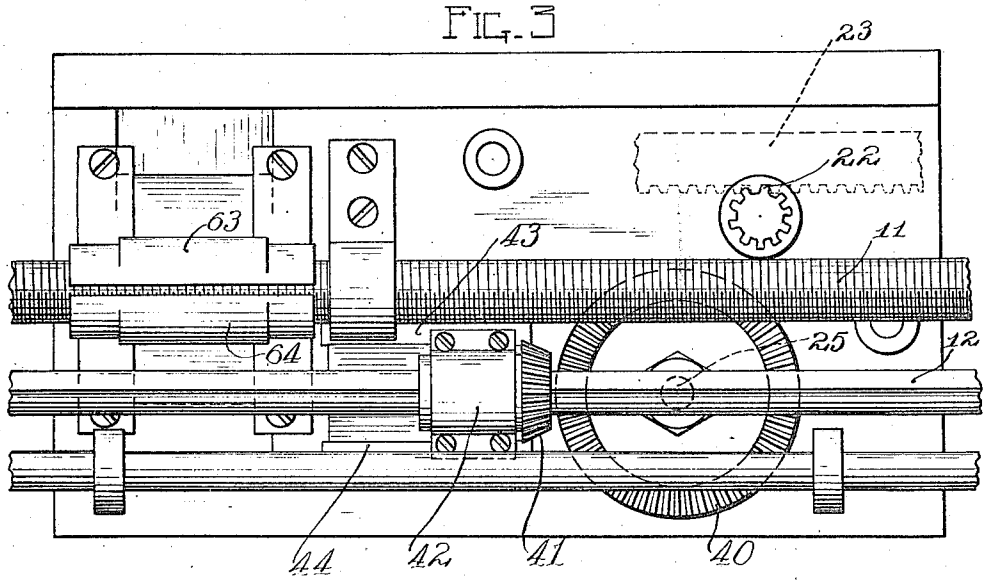
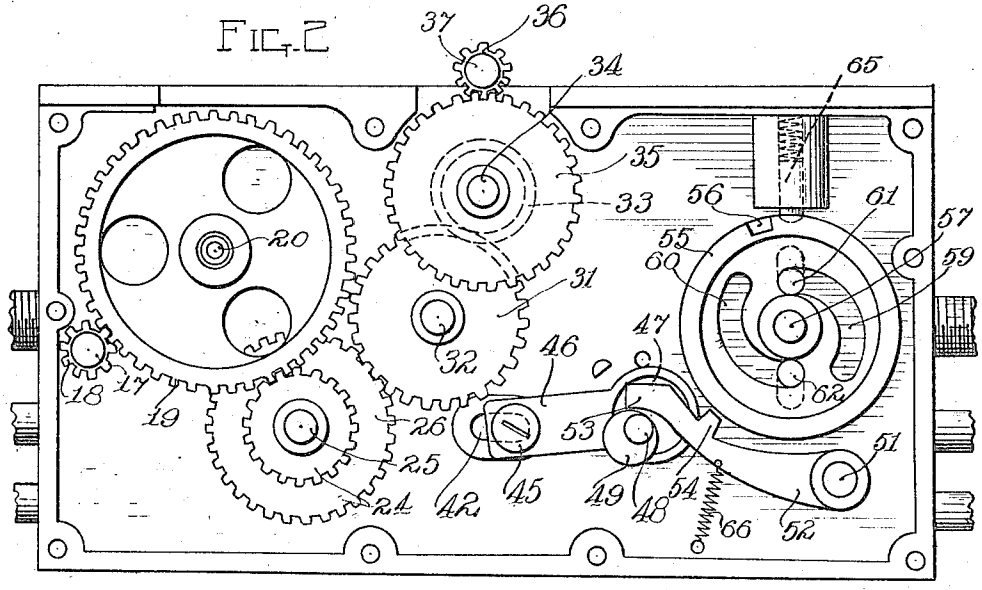


FIG. 2



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3 SHEETS—SHEET 3.

FIG. 4

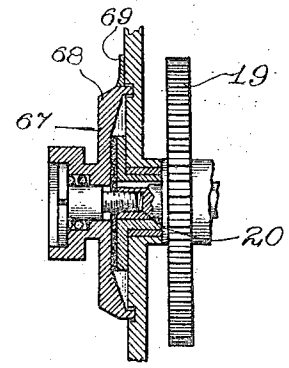
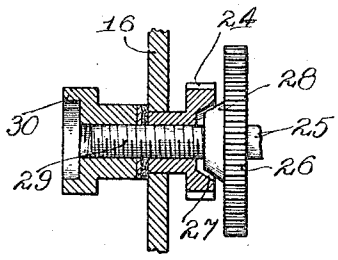


FIG. 5



WITNESSES=

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UNITED STATES PATENT OFFICE.

FRANKLIN HARDINGE, OF CHICAGO, ILLINOIS, ASSIGNOR TO HARDINGE BROTHERS, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

APRON MECHANISM FOR LATHES.

1,282,821. Specification of Letters Patent. Patented Oct. 29, 1918.

Original application filed January 28, 1915, Serial No. 4,841. Divided and this application filed September 4, 1917. Serial No. 189,502.

To all whom it may concern:

Be it known that I, FRANKLIN HARDINGE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Apron Mechanism for Lathes, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to apron mechanism for lathes and more specifically to improved mechanism for connecting the apron or the mechanism carried thereby with a lead screw or feed rod. One of the objects of the present invention is the provision of improved mechanism for preventing a mechanical connection between the lead screw and the apron, and between the feed rod and the apron at the same time. Various forms of automatic lock-outs have been devised and used in the past, but such lock-out mechanism has been either too complicated for use or ineffective in operation.

The present application is a division of my co-pending application Serial No. 4841, filed January 28, 1915.

Further objects of the present invention reside in the novel arrangements, combinations and structures pointed out hereinafter in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of a lathe provided with the mechanism of my invention;

Fig. 2 is an enlarged front view of the apron with the front plate of the apron removed;

Fig. 3 is a rear view of Fig. 2;

Fig. 4 is a detail cross sectional view taken along the line 4—4 of Fig. 1, looking in the direction indicated by the arrows; and

Fig. 5 is a detail cross sectional view taken along the line 5—5 of Fig. 1, looking in the direction indicated by the arrows.

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

Referring first to Fig. 1, 6 designates a lathe bed which has mounted thereon at one end a head stock 7 and at the opposite end a tail stock 8. The head stock 7 is provided with the usual cone pulley 9 and the gearing shown at 10, which leads downwardly to the lead screw 11 and the feed rod 12. The lead screw and feed rod run longitudinally of the lathe in the usual way, and are arranged to be connected with the carriage 13 mounted for longitudinal movement on the lathe bed.

Extending downwardly from the carriage 13 and attached thereto is an apron 14 which contains the lock-out mechanism of the present invention. The apron 14 is made up of a base plate 15 and a cover plate 16. Journaled in the two plates 15 and 16 is a shaft 17 carrying a pinion 18, in turn meshing with a gear 19 keyed to the shaft 20. The outer end of the shaft 17 extends through the front plate 16, and is there provided with an operating handle 21. The shaft 20 to which the gear 19 is keyed carries a pinion 22 at the rear of the apron, this pinion meshing with the gear rack shown at 23. The gear rack 23 is rigidly connected with the lathe bed and extends entirely along the front side thereof, as most clearly shown in Fig. 1.

From the construction thus far described, it will be observed that upon rotation of the crank 21, the carriage may be moved longitudinally of the lathe, due to the gear and rack connection 22 and 23.

The gear 19 permanently meshes with a gear 24 loosely mounted upon a shaft 25. A second gear 26 is mounted on the shaft 25 and is keyed thereto. The gears 24 and 26 are arranged to be locked together, and in Fig. 5 I have shown one form of mechanism for locking the gears. The gear 24 is provided with a conical depression 27, and the gear 24 is provided with a conical part 28 arranged to fit into the depression and form a clutch. The shaft 25 extends outwardly through the front plate 16, and is screw-threaded as shown at 29. The nut 30 cooperates with the outer end of the shaft 29, so that upon manipulation of the nut, the gears 24 and 26 may be connected or disconnected. Permanently meshing with the gear 26 is an intermediate gear 31 mounted on a stud 32. This intermediate gear meshes with a gear 33 keyed to a shaft 34. Mounted loosely on the shaft 34 is a gear 35 meshing with a pinion 36 mounted on a shaft 37. The outer end of the shaft 34 upon which the gears 33 and 35 are mounted is provided with a nut 38 (Fig. 1), and the gears 33 and 35 are formed as are the gears 24 and 26, so

that these gears may be connected or disconnected at will. The shaft 37 upon which the pinion 36 is mounted extends transversely of the lathe, as most clearly shown in Fig. 1, and is arranged to operate the cross feed in the usual way. It is usual to provide the shaft 37 with an operating handle, and I have shown such a handle at 39 in Fig. 1.

Keyed to the shaft 25 and positioned at the rear of the apron is a bevel gear 40 arranged to coöperate with a bevel pinion 41 carried by a block 42. The bevel pinion 41 has a key and slot connection with the feed rod 12, so that it is rotated whenever the feed rod is rotated. The block 42 is mounted in a pair of guides 43 and 44 carried by the apron, so that the block may be reciprocated with respect to the apron. Carried by the block 42 and extending into the interior of the apron through the back plate thereof is a stud 45, to which is pivoted a link 46. This link is connected with an eccentric 47 carried by the shaft 48. The shaft 48 carries a second eccentric 49, which is disposed substantially 180 degrees away from the eccentric 47. The end of the shaft 48 which extends outwardly through the front plate of the apron carries a finger piece 50, which permits the operator to oscillate the shaft 48 and produce the mechanical connections hereinafter pointed out.

Pivoted at 51 to the rear plate of the apron is a locking lever 52 which carries a nose 53 resting against the upper side of the eccentric 45. The locking lever 52 carries a projection 54 intermediate its pivot and the nose 53, which lies directly opposite the wheel 55, so that when the parts are in the position shown in Fig. 2 and the locking lever 52 is swung in a clockwise direction, the projection 54 will be caused to engage the periphery of the wheel 55. The wheel 55 has a depression 56 formed therein which is arranged to receive the projection 54 of the locking lever 52 when the wheel 55 assumes its non-locking position, as will be pointed out presently. The wheel 55 is keyed to a shaft 57, whose outer end carries a handle 58. The base of the wheel contains the two spiral grooves 59 and 60 into which extend respectively the pins 61 and 62. The pin 61 is connected to the split nut member 63, and the pin 62 is connected with the split nut member 64. The pins 61 and 62 extend through suitable guide openings shown in dotted lines in Fig. 2, so that upon rotation of the shaft 57 the split nut members 63 and 64 are caused either to engage or disengage the lead screw 11. If desired, the spring plunger mechanism 65 may be utilized to hold the wheel 55 in any position to which it may be moved. The locking lever 52 has a tendency to move in a counter-clockwise direction (Fig. 2), so that its nose 53 is always in engagement with the eccentric 45. The lever 52 may be held in this position by gravity, or if desired, the spring 66 may be employed.

In Figs. 2 and 3 I have shown the lead screw connected with the apron, or in other words, the lead screw connected with the split nut members 63 and 64. In order to connect the feed rod with the bevel gear 40, it is necessary to grasp the finger piece 50 and rotate it in a counter-clockwise direction. If, when the wheel 55 assumes the position shown in Fig. 2, an attempt is made to rotate the shaft 48, the nose of the locking lever 52 is lifted a small distance and the projection 54 caused to engage the periphery of the wheel 55. Further movement of the shaft is thereby prevented. It will be seen, therefore, that it is impossible to connect the feed rod with the apron when the lead screw is connected therewith. In order to provide the necessary connection with the feed rod, it is necessary first to disconnect the lead screw from the apron, and this is accomplished by grasping the lever 58 and turning it in a counter-clockwise direction. The spirals 59 and 60 then act upon the pins 61 and 62 and move them outwardly away from the shaft 57. The split nut members 63 and 64 are then caused to disengage the thread of the lead screw. When the wheel 55 has been advanced to a position where the pins 61 and 62 are located at the ends of the spiral slots 59 and 60 opposite the ends at which they lie in Fig. 2, the recess or depression 56 lies opposite the projection 54 of the locking lever 52. The finger piece 50 mounted on the shaft 48 may then be grasped and the shaft, together with its eccentric 47 rotated in a counter-clockwise direction to cause the block 42 to move toward the bevel gear 40 and provide a connection between the gear 40 and the bevel pinion 41. When the lead screw 12 is connected with the apron, or, in other words, when the pinion 41 is meshing with the gear 40, it is impossible to connect the lead screw with the apron until the feed rod has been disconnected, due to the fact that the projection 54 of the locking lever 52 extends into the depression 56 of the wheel 55. By manipulating the nuts 30 or 38, power may be transmitted either from the feed rod to the cross feed shaft 37, or from the feed rod to the pinion 22, which meshes with the gear rack 23. If the feed rod is connected with the cross feed shaft 37, the cross feed mechanism may be moved transversely of the lathe automatically. If the feed rod is connected with the pinion 22 the entire carriage may be moved longitudinally, automatically.

In Fig. 4 I have shown the outer end of the shaft 20 in detail. The outer end of the shaft 20 is frictionally connected with a plate 67 containing suitable indicia on its

face 68, as most clearly shown in Fig. 1. A vernier scale is employed at 69 and is arranged to coöperate with the indicia 68 carried by the plate 67, to indicate to the workman the amount of longitudinal travel of the lathe carriage. The plate 67, due to its frictional connection with the shaft 20, is adapted to be set to any position, so that the plate may be moved to the zero position whenever the workman finds it necessary. The mechanism just referred to and shown in detail in Fig. 4 forms no part of the present invention, and is described in detail and claimed in my co-pending application Serial No. 130,727, filed November 11, 1916.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A lathe comprising a carriage apron, gearing mounted on the apron, a lead screw, a feed rod, split nut mechanism for connecting the apron and lead screw, a shaft for operating the split nut mechanism, a locking cam fixed to the shaft, said cam having a recess in its periphery, a second shaft for connecting the feed rod with the apron gearing, a cam fixed thereto, a pivoted lever operated by said cam, said lever being arranged to engage the periphery of the cam and have its movement limited thereby when the cam assumes one position, and arranged to have a greater movement into the said recess when the cam assumes a second position, to provide an automatic lockout for the lead screw and feed rod.

2. In a lathe the combination of a carriage apron, gearing on the apron, a lead screw, means for connecting said lead screw to said apron, comprising a shaft, a locking wheel on said shaft, a feed rod, means for connecting said gearing and feed rod comprising a gearing splined to said feed rod, a link for moving said gear into and out of mesh with said gearing, a shaft having an eccentric thereon for reciprocating said link, a second eccentric on said shaft, a locking lever actuated by said second eccentric, the said locking wheel and locking lever being provided with means for locking said first named shaft when said second shaft is rotated and for locking said second shaft when said first named shaft is rotated.

3. In a lathe the combination of a carriage apron, gearing on said apron, a lead screw, means for connecting said lead screw to said apron comprising a shaft, a feed rod, means for connecting said feed rod to said gearing comprising a gear splined to said feed rod, means for moving said gear into and out of driving relation with said gearing comprising a shaft, and means for locking said first named shaft in its inoperative position when said last named shaft is actuated to connect said feed rod and gearing and for locking said last named shaft in inoperative position when said first named shaft is actuated to connect said lead screw and said apron.

4. In a lathe the combination of a carriage apron, gearing on the apron, a lead screw, means for connecting the lead screw to the apron comprising a shaft, a locking wheel on said shaft having a recess in the periphery thereof, a feed rod, means for connecting said feed rod in driving relation with said gearing comprising a shaft, an eccentric on said shaft, a locking lever provided with a lug adapted to be received in said recess when in registry therewith but engaging the periphery of said wheel and preventing movement of said lever when not in registry with said recess, the said lever being actuated by said eccentric to lock said wheel when said last named shaft is rotated.

In witness whereof I hereunto subscribe my name this 29th day of August, A. D. 1917.

FRANKLIN HARDINGE.

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