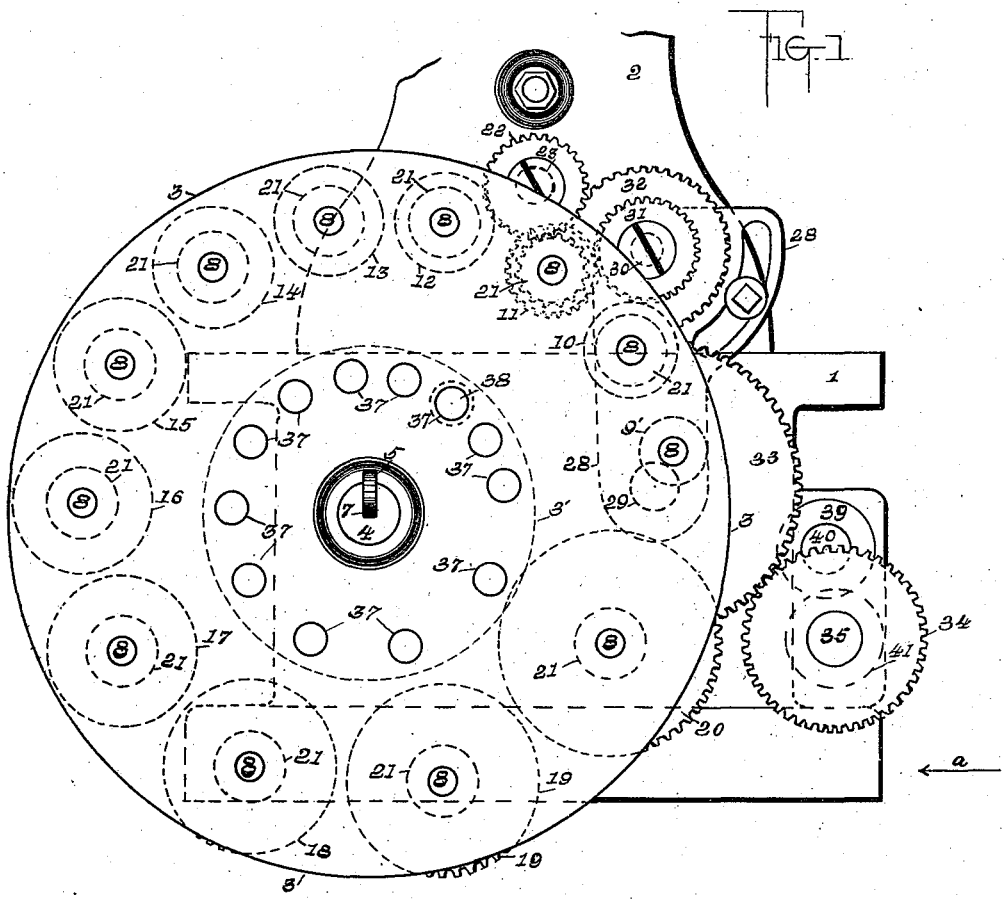
(No Model.) 4 Sheets—Sheet 1.

E. FLATHER.

SCREW CUTTING LATHE.

No. 536,615. Patented Apr. 2, 1895.



WITNESSES:

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Edward A. Hoffman

INVENTOR

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BY Geo. D. Phillips

HIS ATTORNEY.

(No Model.) 4 Sheets—Sheet 2.

E. FLATHER.

SCREW CUTTING LATHE.

No. 536,615. Patented Apr. 2, 1895.

FIG 2

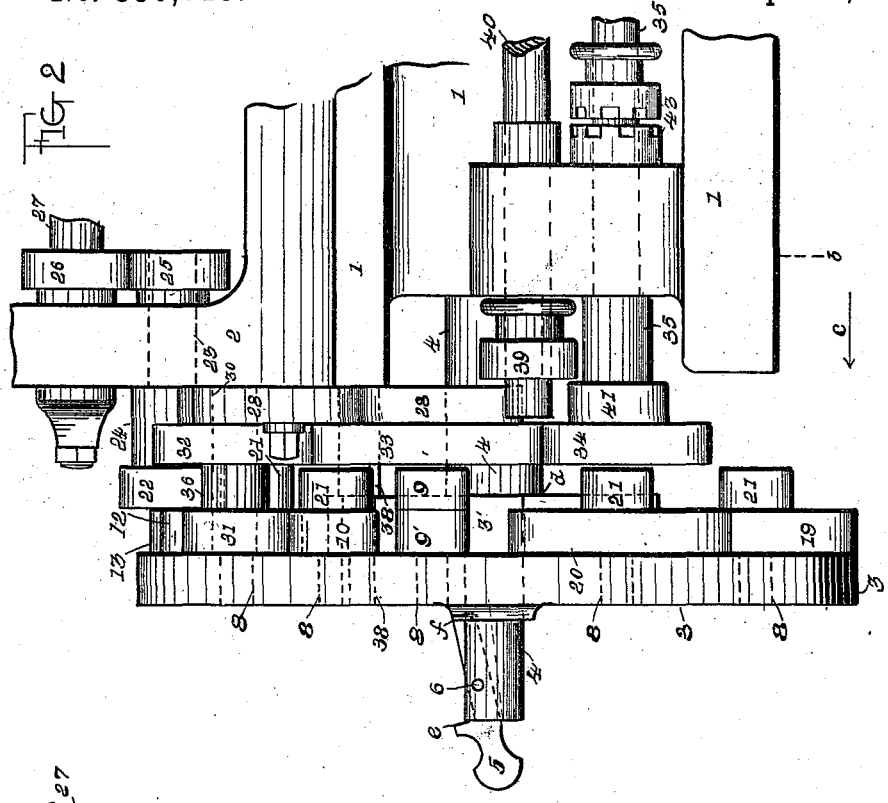
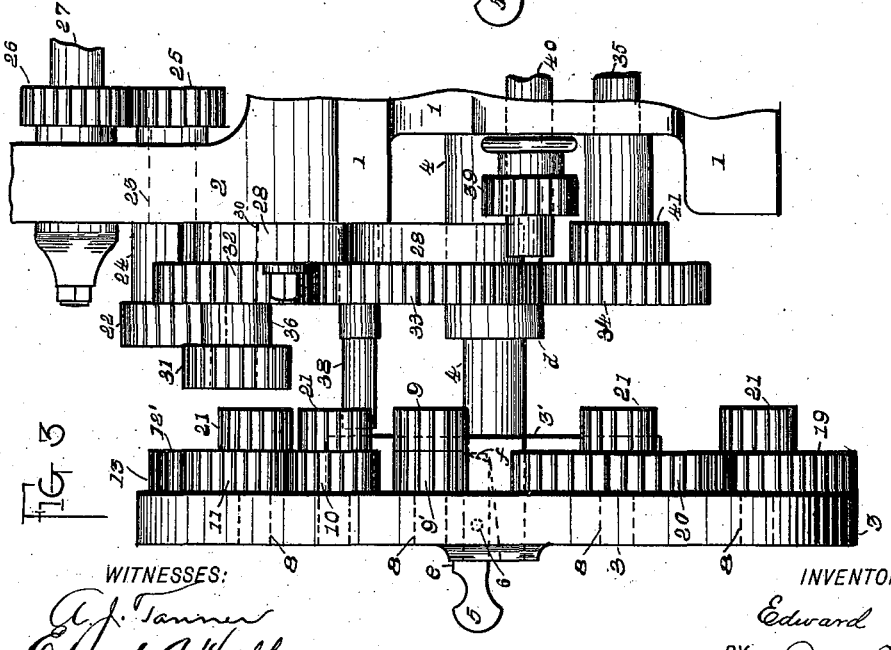


FIG 3



WITNESSES:

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(No Model.) 4 Sheets—Sheet 3.

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SCREW CUTTING LATHE.

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FIG. 4

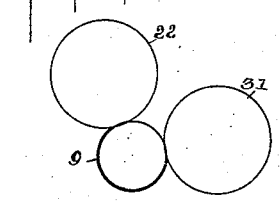


FIG. 5

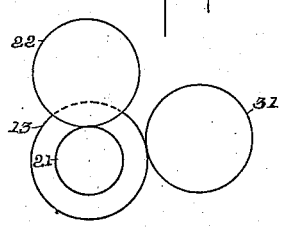
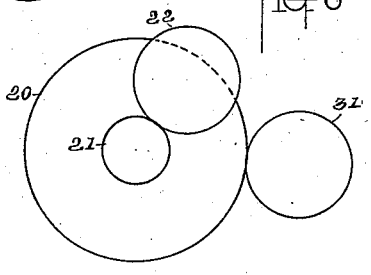


FIG. 6



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(No Model.) 4 Sheets—Sheet 4.

E. FLATHER.

SCREW CUTTING LATHE.

No. 536,615. Patented Apr. 2, 1895.

FIG. 7

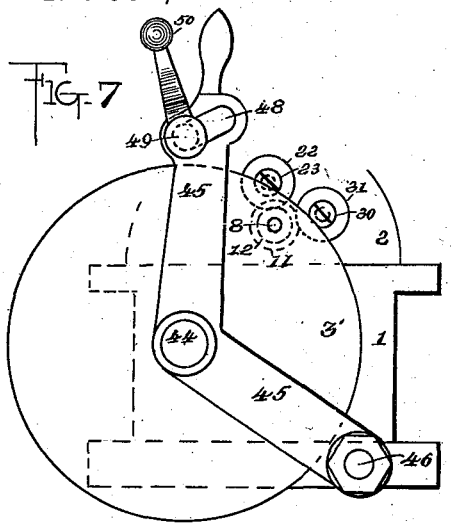


FIG. 8

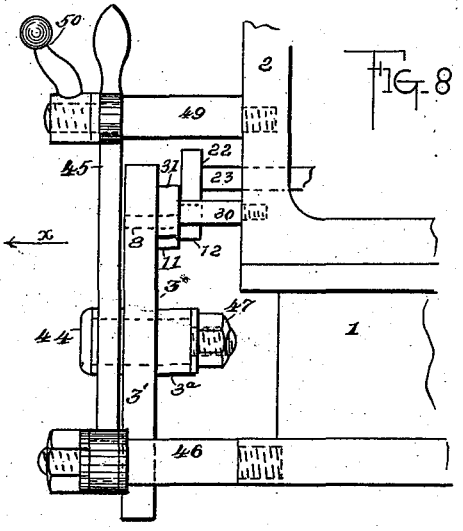


FIG. 9

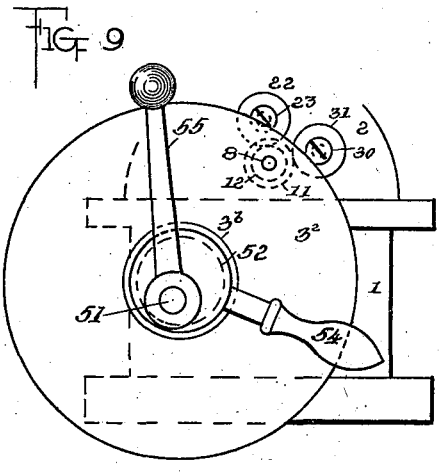
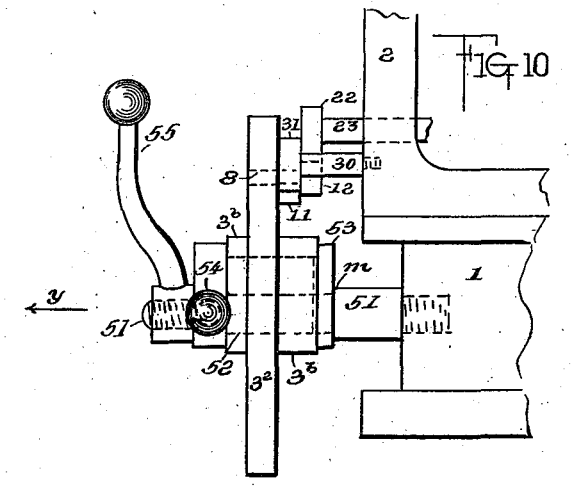


FIG. 10



WITNESSES:

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UNITED STATES PATENT OFFICE.

EDWARD FLATHER, OF BRIDGEPORT, CONNECTICUT.

SCREW-CUTTING LATHE.

SPECIFICATION forming part of Letters Patent No. 536,615, dated April 2, 1895.

Application filed August 27, 1894. Serial No. 521,389. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FLATHER, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Screw-Cutting Lathes, of which the following is a specification.

My invention relates to engine lathes and particularly to an improvement in the screw cutting and feed mechanism therefor.

The details of construction of this my said invention will be fully set forth and described in the following specification, and such characteristic features as I believe to be new and novel particularly pointed out in the claims to follow.

To enable others to understand my invention reference is had to the accompanying drawings, in which—

Figure 1, represents a front end view of the bed and broken head stock of an engine lathe with my improved gear plate attached thereto and Fig. 2, is a broken side elevation of the bed and head stock also side elevation of the adjustable gear plate in closed position with two of its gears registering with driving gears mounted on the head stock of the lathe. Fig. 3, is a view similar to Fig. 2, but showing the gear plate in open position, *i. e.*, out of engagement with the two gears of the lathe; Figs. 4, 5 and 6, diagrams of the gears of the head stock engaged with certain gears of the gear plate looking in the direction of arrow *c*. Fig. 2. Fig 7, is an end view of the bed and broken view of the head stock of a lathe showing a modified construction for bringing the gear plate into closed position by means of an angle lever pivoted to a stud on the bed. Fig. 8, is a broken side elevation of the bed and head stock looking in the direction of arrow *x* of Fig. 7. Fig. 9, is an end elevation of the bed and broken view of the head stock showing still another modification of the means for bringing the gear plate, with the gears, into and out of mesh with the gears of the lathe, which consists of an eccentric sleeve mounted on a stud and supporting the said gear plate. Fig. 10, is a broken side elevation of the bed and head stock as shown in Fig. 9, looking in the direction of arrow *y*.

Its construction and operation are as follows:

1 represents the lathe bed; 2, the head stock mounted thereon.

3 is the gear plate mounted on a reduced portion of the stud 4, (see Fig. 3) projecting from the end of the bed 1. The said plate, when in the position as shown in Fig. 3, can be freely rotated so as to bring any of its gears to register with the gears of the head stock and its inward longitudinal movement is limited by the boss 3′ of plate 3, engaging with the shouldered portion *d*. of stud 4. The outward travel of said plate is limited by the projecting stop *e*. of the swinging latch 5, which latch is pivotally mounted on the pin 6 of the stud 4. The slot 7 (see also Fig 1) is provided in the end of stud 4 to accommodate the latch 5. When, therefore, the plate 3 is in the position shown in Fig. 2, the head of latch 5 is depressed and the point *f* thereof is cammed against the outer face of said plate, a circular groove, not shown, being formed therein for this purpose, thus maintaining it firmly in its closed position. Depressing the point *f*. of said latch will bring the body of said latch below the surface of stud 4 so that the gear plate will slide over it, and engaging with the stop *e*. before mentioned, will arrest further travel and prevent plate 3 dropping off its stud.

Projecting from the gear plate 3 (see also Fig. 1) and arranged circumferentially about the same are the studs 8, each of which carrries two gears of different diameters except (see also Figs. 2 and 3) the gears 9 and 9′ which are of equal diameter. The other gears 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 are placed on their respective studs next to the plate while the smaller gears 21, which are fastened to the other gears mounted on said studs, are equal in diameter to the gears 9. 9′, before mentioned, although different sizes may be used. The positions of the several studs vary from the center of plate 3 proportionate to the different diameters of the gears, so that, the studs carrying the small gears 9. 9′ and large gear 20 represent the extremes of this variation.

The initial driving gear 22 of the train is mounted upon the outer end of the stud 23

journaled in the head stock, and is arranged to stand out therefrom a distance equal to the length of the interposing collar 24. The inner end of such stud carries the gear 25 which registers with gear 26 of the lathe spindle 27. The swing plate 28 mounted on the stud 30 of the head stock carries upon this stud 30, the two idle gears 31 and 32, the latter registering with the intermediate gear 33 on the stud 29 of the swing plate, which, in turn, registers with gear 34 mounted on the projecting end of the feed shaft 35. The said gears 31 and 32 are secured to the sleeve 36, so that they rotate together.

The gears 22 and 31 are so placed, with respect to each other and the several gears carried by the plate 3, that when such plate is moved forward, as shown in Fig. 2, two gears of the series thereon will register with said gears, the outer, and smaller gear 21, engaging the gear 22 while the larger gear 11 meshes with gear 31. This feature will be more clearly illustrated by the diagrams shown in Figs. 4, 5 and 6. Fig. 4 represents the engagement of the two small gears 9. 9′ of the gear plate 3 with gears 22 and 31, wherein, as before mentioned, such gears 9. 9′ are of equal diameters, and therefore, their position is midway between such gears. In Fig. 5 the gears 13 and 21 are brought into engagement and the difference in diameter of such gears will cause the smaller one 21 to be placed in almost a vertical position with gear 22, so as to enable gear 13 to register with gear 31. In Fig. 6 is shown the largest gear on plate 3 engaged with gear 31 while the small gear 21 registers with gear 22. Thus, as before mentioned, the positions of the several studs 8, on the plate 3, are so placed with respect to the center of such plate, and the diameter of the several gears on such studs, that each set of gears thereon will register with gears 22 and 31; the outer one registering with the former, and the inner gear with the latter, as above described. It will be observed that there are twelve studs on plate 3 each carrying two gears, thus making twelve changes or twelve different pitches that may be cut on the lathe, which comprise the number in general use. If more are required, the gear plate may be increased in size to accommodate more studs and gears, thereby increasing the number of pitches indefinitely.

A series of holes 37, Fig. 1, are provided in the gear plate 3, and such holes are preferably arranged on the same radial line with the several studs 8.

38 is a stop and locating pin projecting from the bed (see also Fig. 3) which registers with the holes 37 of the gear plate, as required. When, therefore, it is desired to cut a certain pitch, the gear plate is rotated upon the supporting stud until the proper gears thereon are brought into position to register with the gears 22 and 31, as before mentioned, when the plate 3 is moved forward and the pin 38 interlocked with one of the holes 37, representing such position. This pin not only locates the exact position of the gears on the plate with respect to their proper registering with the gears 22 and 31, but it also prevents the rotation of such plate while it is in operative position. It will be observed that the pin 38 is made sufficiently long so as to enter one of the holes 37 of the gear plate in advance of the registering of the gears, thus operating as a guide for the proper engagement of such gears. To insure a ready engagement of said pin with its hole, the point may be slightly tapered, or the mouth of the hole may be slightly beveled for this purpose.

In cutting screws, the sleeve gear 39 on the end of the feed screw 40 is moved forward into mesh with the gear 41 on the feed shaft 35, while the clutch 43, on the latter shaft, will be disengaged, as shown. Reversing this operation will drive the feed shaft.

I do not wish to be confined to the exact location of the so called driving gear 22, as, in some cases, it may be desirable to allow the spindle 37 to project through the head stock and place such gear thereon. If other changes are required, beyond the limit represented by the twelve already carried by the gear plate, the swing plate 28 may be shifted so as to substitute other gears in place of the one 34, on the end of the feed rod.

It will be observed that, the manner of operating the gear plate so as to bring its gears thereon in mesh with the driving gear and idle gear of the lathe, before mentioned, such plate has a longitudinal movement on its stud. As a modification of this feature and one which in some cases may be advantageously used, would be to attach the stud, upon which the plate is supported, to a swing plate pivotally supported to the bed or other convenient place and thus raise and lower the said gear plate in andout of mesh, in which case, said plate will retain its present rotary movement while the longitudinal movement will be replaced by a vertical one. This construction is shown in Figs. 7 and 8, wherein the gear plate 3′ is, with respect to the gears it carries, similar to that shown in the preceding views; but, for an illustration of the elevating device only two gears, 11 and 12, are shown. The said plate is rotatably mounted upon the stud 44, which stud, is also rigidly secured to the middle portion of the handle lever 45 whose lower end is pivotally supported on the stud 46 projecting from the lathe bed. The plate 3′ has the hub portion 3^a to increase its bearing surface on its stud and is locked against rotation thereon by the nut 47. The upper end of the handle lever 45 is provided with the slot 48 which embraces a reduced threaded end of the stud 49 projecting from the head stock 2. The tightening-handle nut 50 is mounted on the threaded end of stud 49 so as to lock the gear plate while in closed position.

The operation of the device is as follows: When necessary to change the gears the han-

dle nut 50 is loosened, whereupon the gear plate will drop a distance represented by the length of the slot 48 which is sufficient to carry any of the gears thereon out of mesh with the driving and idle gears of the lathe. Then the nut 47 is loosened so that said plate may be rotated on the supporting stud a distance required to bring any of its gears in position to register with the lathe gears, before mentioned, when the nut 47 is tightened and the plate carried forward to the position shown at Fig. 7, and the handle nut 50 tightened to retain it there.

As a further modification relating to the gear plate I might find it convenient to employ an eccentric sleeve on the supporting stud of the gear plate, and journal the plate on this sleeve, which arrangement, will enable the eccentric to be used as a means for establishing the different vertical positions of the plates with respect to the lathe gears. This construction is fully shown at Figs. 9 and 10. The gear plate 3^2 like the one shown at Fig. 7, carries, for illustration, the two gears 11 and 12 only. The plate—supporting stud 51—projecting from the bed 1, carries on its reduced portion the eccentric sleeve 52. The gear plate 3^2 is provided with the enlarged hubs 3^b having a hole therethrough to fit the sleeve 52 on which it is arranged to rotate when said plate is dropped. 53 is a collar placed between the inner end of the gear-plate hub and the shoulder *m* of the stud 51. The eccentric sleeve 52 has the handle 54 by means of which it is rotated on its stud. The handle nut 55 is mounted upon the threaded end of the stud 51. To operate this device the handle nut 55 is loosened and the eccentric sleeve turned—by means of its handle 54—until the gears on plate 3^2 are disengaged from the lathe gears, before mentioned, whereupon, said plate is rotated until the proper gear thereon is brought into position, when the eccentric sleeve is rotated to bring said gears in mesh with those of the lathe, and the handle nut 55 tightened to hold said plate rigid. I therefore do not wish to be confined to the exact construction as shown for this purpose, but hold myself at liberty to use this feature as well as the other modification before mentioned.

From the foregoing, the advantages of my improvement can readily be seen and appreciated. It is both cheaply constructed and easily operated. The gear plate contains all the necessary changes of gears to cut the different pitches in general use. When, therefore, the two gears on the plate are engaged with the driving gear and idle gear of the lathe, all the other gears on the plate remain stationary. This feature, as well as another important one not shown in other screw cutting devices, so far as known, viz: when the gear plate is disengaged from the lathe gears as shown in Fig. 3 all the gears, screw cutting and feeding, on the lathe as well as on the plate, except the driving gear 22, are in a state of absolute rest, so that the lathe may be used independent, as is frequently required, and thus avoid the wear incidental to continuous running of said gears.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An improvement in lathes, of the character described, comprising in combination, with the head stock and bed, a gear plate, a support therefor upon which said plate is arranged when not in operative or closed position, to have both a rotatable and longitudinal movement thereon, said plate carrying a series of gears representing the several pitches that may be cut on the lathe, and supports for said gears as set forth.

2. The herein described improvement in lathes, consisting of a gear plate carrying a series of independent sets of gears representing the several pitches that may be cut on the lathe, supports therefor, which occupy different radial positions with respect to the center of said plate, each support carrying a pair of gears of the said series, one of which is arranged to register with the driving gear of the lathe and the other to register with an idle gear adjacent to said gear, a support upon which said gear-plate may have both a rotatable and longitudinal movement, and means whereby said plate is securely locked against rotation and longitudinal movement, when in closed position as set forth.

3. The herein described improvement in lathes, comprising in combination, a gear plate carrying independent sets of gears, arranged as shown, a support for said plate, upon which it may be rotated to bring each set of gears or change of gears thereon in position to engage with the driving gear and an idle gear of the lathe train, said plate having also a longitudinal movement on its support whereby it is brought into operative engagement with the said gear train, means substantially as shown for guiding it into operative position and locking it against rotation, and means for locking it against longitudinal movement while in such position, as described and for the purpose set forth.

4. The herein described improvement in lathes, comprising in combination, a gear plate carrying independent sets or changes of gears arranged circumferentially about said plate, and occupying different radial positions from the center thereof, supports for said sets of gears and a support for said plate upon which it may have both a rotatable and a longitudinal movement, when not in operative position, a driving gear on the lathe, a pair of idle gears locked together and mounted on the same bearing stud, said gear plate arranged to be rotated upon its support to bring any one of the independent sets or changes in line with the proper gear mechanism of the lathe, and having a longitudinal movement thereon whereby one gear of the set on said plate will register with the said

driving gear and the other with one of the pair of idle gears, while the remaining idle gear registers with the train of the lathe gears connected with the screw cutting or feeding mechanism, and means whereby said plate is effectually locked against longitudinal and rotary movement, when in operative position, substantially as described and for the purpose set forth.

5. The herein described improvement in lathes, comprising in combination, a gear plate carrying independent sets of gears, a support therefor, supports for said gears, said gears fastened so as to rotate together on their respective supports, a fixed stud on the lathe carrying the sleeve 36, with the two gears, 31 and 32, fixed thereto, said gear plate arranged to be rotated on its support and also adjusted in the plane of its rotation so as to bring any one of the several sets of gears thereon in position, one, in said set, registering with the lathe-driving gear, and the other with gear 31 of said sleeve, while gear 32 of said sleeve registers with the intermediate gear of the feed mechanism, as described and set forth.

6. The herein described improvement in lathes, comprising in combination, a gear plate carrying independent sets of gears, a supporting stud projecting from the end of the lathe upon which said gear plate is rotatably mounted, supporting studs projecting from the inner face of said plate, upon which studs the said independent sets of gears are rotatably mounted, said gears placed between said plate and the end of the lathe so that said plate will operate as a shield to protect against accidents, combined with the gears of the lathe with which the gears on said plate are brought into engagement, for the purpose set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 25th day of August, A. D. 1894.

EDWARD FLATHER.

Witnesses:
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