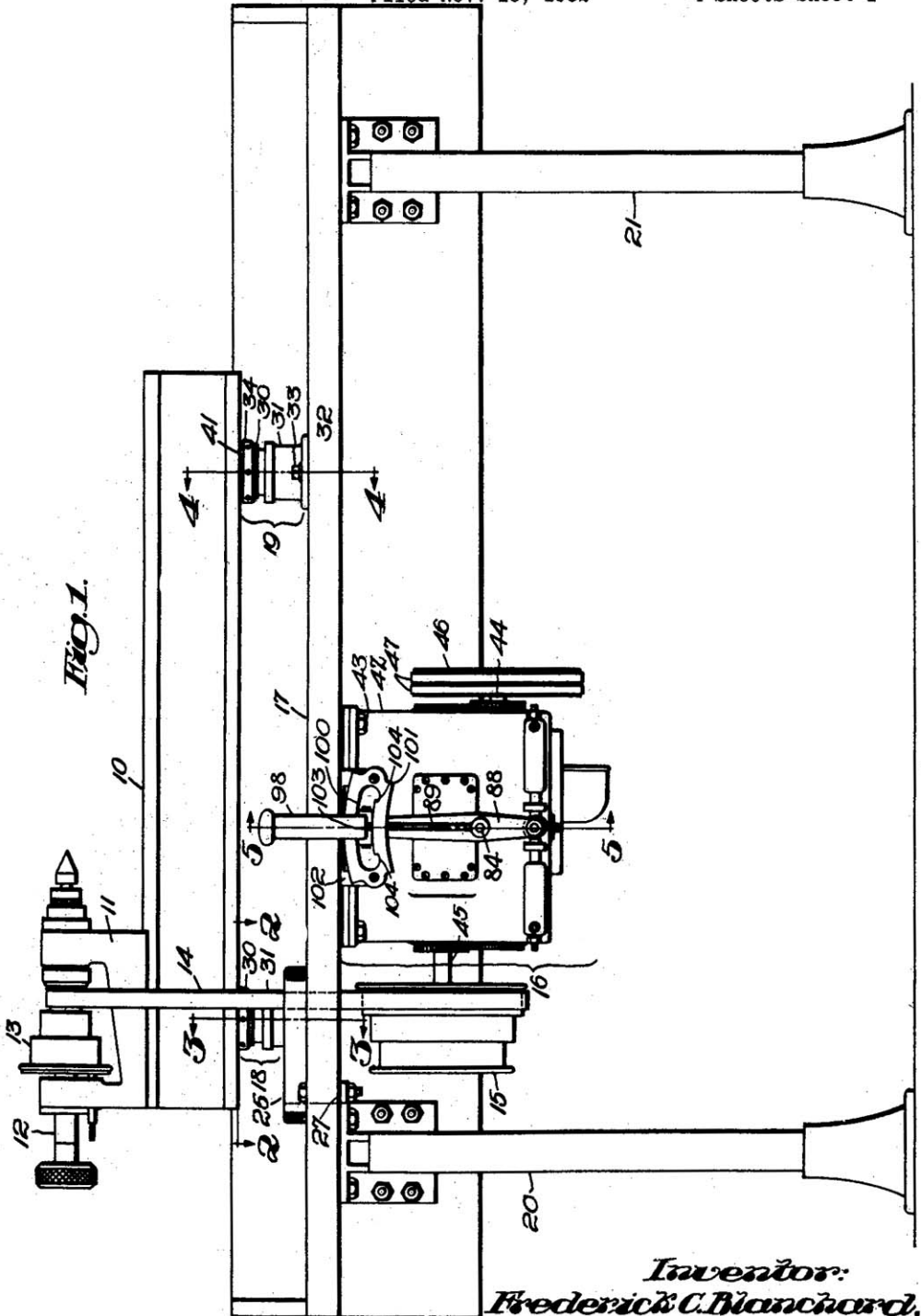


LATHE

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FIG. 1.



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Fig. 2.

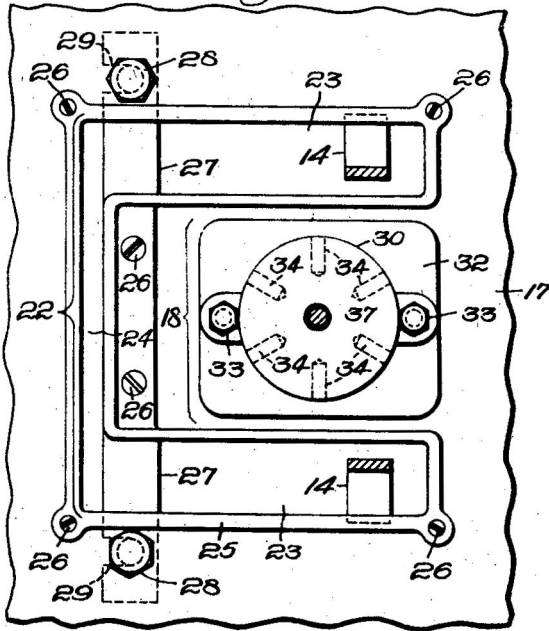


Fig. 3.

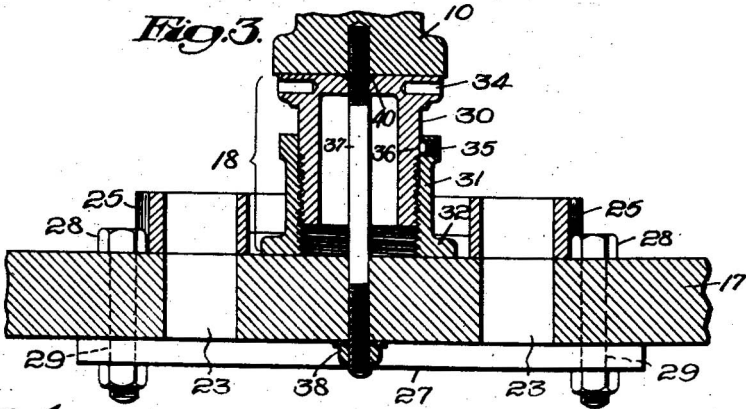
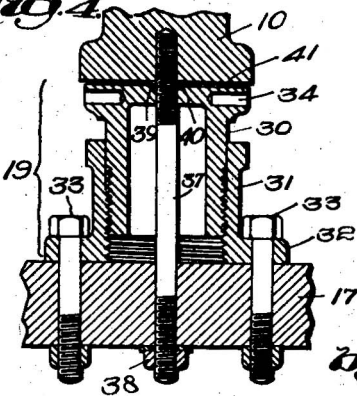


Fig. 4.

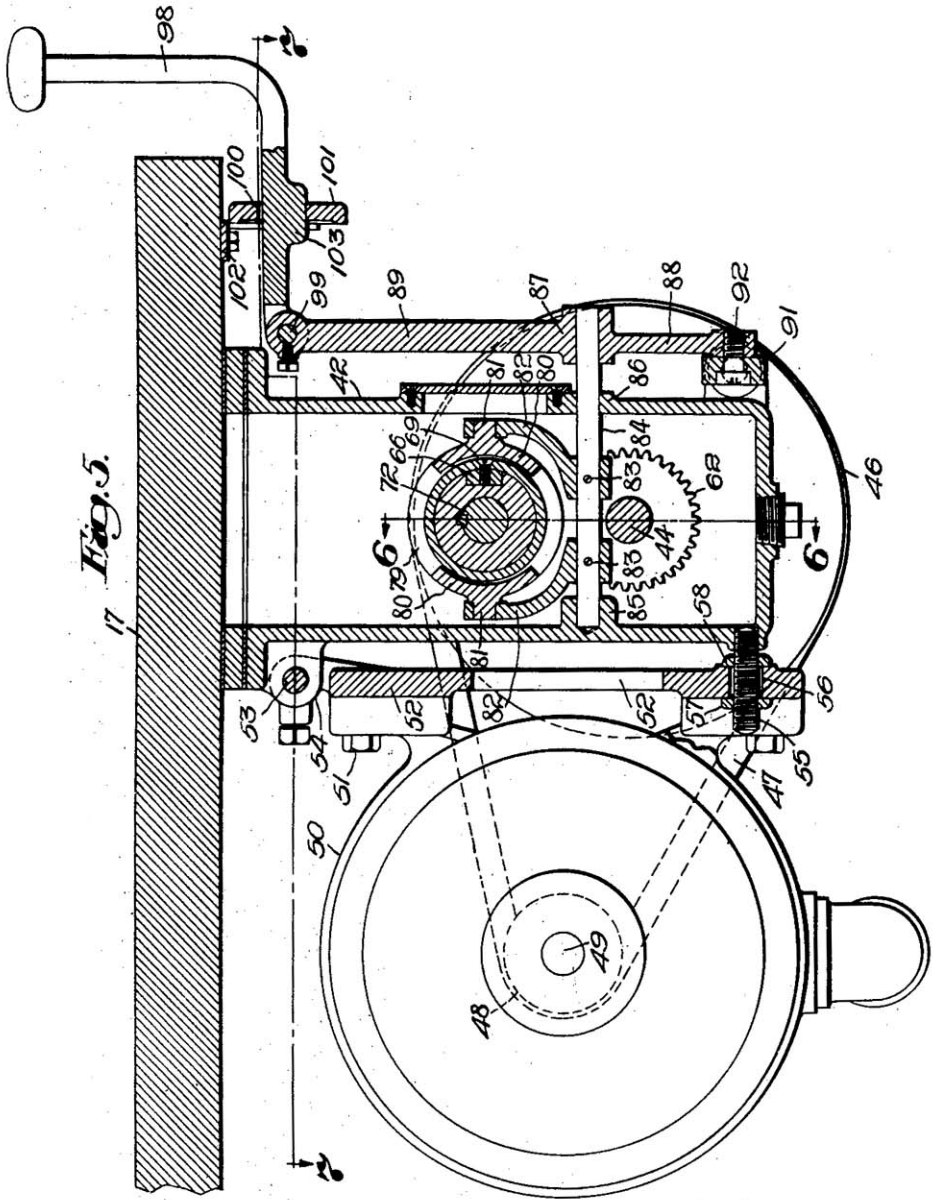


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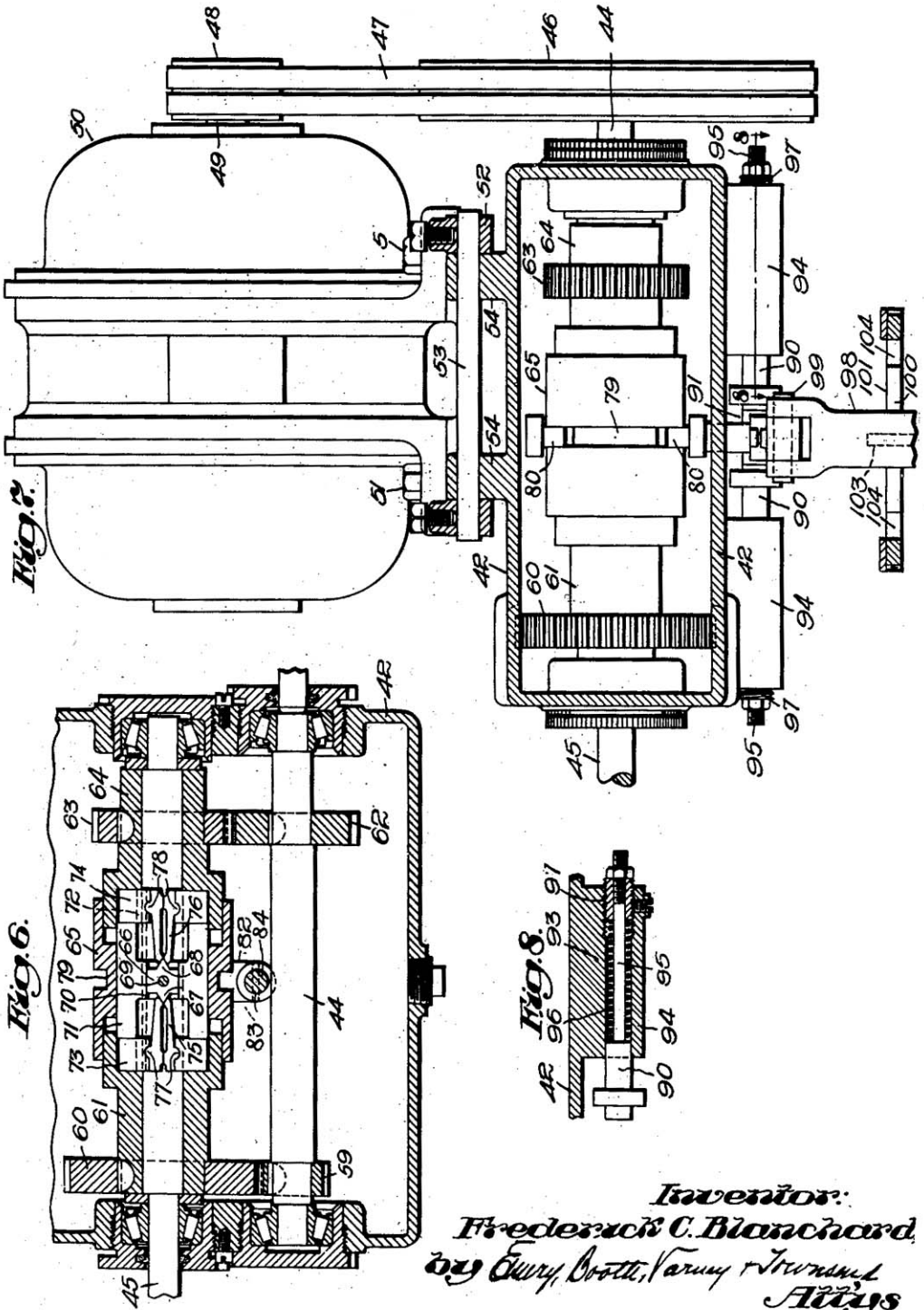


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## UNITED STATES PATENT OFFICE

2,043,967

LATHE

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Application November 15, 1932, Serial No. 642,728

11 Claims. (Cl. 82—2)

This invention relates to lathes, and is more particularly concerned with a novel and improved lathe of the class known as precision lathes, intended for use in connection with small, light work requiring great accuracy. In lathes of this class, the lathe bed, instead of being mounted directly upon legs, is mounted upon a support such as a bench, a cabinet or an oil pan. In the case of an oil pan, the latter is mounted upon legs.

The invention aims to improve the lathe drive by providing for the use of an "endless" belt between the cone-pulley of the head-stock and the cone-pulley of the speed box, as distinguished from a jointed belt having a lacing or a metallic fastener. Such fasteners are noisy, and produce considerable vibration, which impairs the accuracy of the work. This invention enables a so-called "endless" belt to be employed, and provides for the quick and convenient installation and removal of the belt, and for the adjustment of the tension of the latter. The invention also aims to provide means for adjusting and maintaining the tension of the belt or belts which transmit the power of an electric motor to the driving shaft of the speed box.

Another feature of the invention is a novel and improved, speed-box control, including a manually operable, speed-selecting lever and automatic locking means therefor.

The invention will best be understood by reference to the following description, when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be pointed out more particularly in the appended claims.

In the drawings:

Fig. 1 is a front elevation of a lathe, a bench and a power transmission system embodying the invention;

Fig. 2 is a horizontal sectional view, on an enlarged scale, on line 2—2 of Fig. 1;

Fig. 3 is a vertical, sectional view, on an enlarged scale, on line 3—3 of Fig. 1;

Fig. 4 is a vertical, sectional view, on an enlarged scale, on line 4—4 of Fig. 1;

Fig. 5 is a sectional view, on an enlarged scale, on line 5—5 of Fig. 1;

Fig. 6 is a vertical, sectional view, on line 6—6 of Fig. 5;

Fig. 7 is a horizontal, sectional view, on line 7—7 of Fig. 5; and

Fig. 8 is a sectional view on line 8—8 of Fig. 7.

Referring to the drawings, and to the embodiment of the invention selected for illustration, having reference at first to Fig. 1, there is shown a lathe comprising a bed 10, on which is mounted a head-stock 11, and journaled in the latter is a spindle 12, to which is secured a cone-pulley 13, connected by a belt 14 to a cone-pulley 15, which is driven by a speed-box 16, hereinafter de-

scribed. The bed is mounted on a suitable support, such as a bench 17, by pedestals 18 and 19 presently to be described in detail. The bench, in turn, is supported by appropriate legs 20 and 21.

To enable the endless belt to be employed, and to provide for the quick and convenient installation and removal of the same, the bench (see Fig. 2) is provided with a single opening 22, through which both leads of the belt extend, thereby to permit removal and replacement of the belt to be accomplished by passing the belt bodily through the opening. As herein shown, this opening is a U-shaped slot, having longitudinal portions 23, through which the leads of the belt extend, and a transverse portion 24 connecting the longitudinal portions. About the slot is a correspondingly-shaped guard 25, suitably secured as by screws 26 to the top of the bench. By first slipping the belt off the lower pulley 15 and toward the left, as viewed in Fig. 1, and then lifting the belt and moving its upper part toward the left until it clears the head-stock and the spindle, one lead of the belt may be passed through the transverse portion 24 of the U-shaped slot to bring both leads into one of the longitudinal portions 23, whereupon the belt may be removed bodily.

As herein shown, that portion of the bench which is between the longitudinal portions 23 of the slot 22 supports the pedestal 18, and to strengthen the bench at this point there is provided an underlying brace 27 spanning the longitudinal portions of the slot, and suitably secured in place as by bolts 28. To facilitate the removal of this brace as a preliminary to removal and replacement of the belt, the brace is provided with slots 29, through which the bolts extend. Accordingly, removal of the brace can be accomplished by simply loosening the bolts, without removing them.

Thus, it will be evident that noise and vibration can be avoided by the use of an endless belt,—that is, one having no lacing or fastener, and yet the belt can be removed and replaced conveniently and speedily. As the belt is endless, naturally means should be provided for adjustment of its tension, and for that purpose the pedestals 18 and 19 illustrated in detail in Figs. 3 and 4 are made adjustable vertically. As these pedestals are identical, a description of one will suffice for both. The pedestal (see Fig. 3) comprises two telescopically-arranged sleeves 30 and 31, having screw-threaded engagement with each other, the sleeve 31 having a base 32 suitably secured, as by bolts 33, to the bench. In the case of the pedestal 18, the base 32 extends lengthwise of the lathe, whereas in the case of the pedestal 19, the base extends transversely. The sleeve 30, as herein shown, is provided with a set of capstan holes 34 to receive a bar, by means of which the sleeve may be turned. To preserve the

level of the lathe body, both pedestals should be adjusted alike. To preserve the adjustment, a set-screw 35, threaded into the sleeve 31, engages a soft metal button 36, which bears against the smooth cylindrical portion of the sleeve 30, and clamps the latter without injury to its surface.

A stud 37, associated with each pedestal and extending axially through the sleeves, is threaded fixedly into the lathe bed 10, and extends through the bench 17 to the under side of the latter, where it is provided with a nut 38, by means of which the bed and the pedestal may be clamped securely to the bench. Naturally, the nut 38 must be loosened before adjustment of the height of the pedestal is made.

To compensate for inaccuracies or warping of the bench, while the lathe bed rests directly upon one of the pedestals, it is spaced from the other (see Fig. 4) by suitable means permitting the pedestal to accommodate itself to the bench, without distortion of the lathe bed, such means herein comprising a spherical or shallow, tapered washer 39, surrounding the stud 37 and received in a correspondingly-shaped depression 40 in the top of the sleeve 30, and there is a space 41 between the top of the sleeve and the bottom of the lathe bed.

The speed-box will now be described, reference being had at first to Fig. 1. A housing 42 is suitably secured, as by bolts 43, to the under side of the bench 17, and contains a driving shaft 44 (see Fig. 6) and a driven shaft 45. The driving shaft, as viewed from the front of the lathe, projects from the right-hand end of the housing, while the driven shaft projects from the left-hand end of the latter. Power is furnished to the driving shaft, as by a grooved pulley 46, connected by one or more, herein two V-belts 47 to a pulley 48, the latter being secured to and driven by a shaft 49 of an electric motor 50, which is secured as by cap-screws 51 to a plate 52. To adjust the tension of the belts, this plate is hingedly mounted on a rod 53, which is supported by ears 54 on the housing 42. Adjustment is conveniently effected by a stud 55, fixedly threaded into the housing 42, and extending loosely through an opening 56 in the plate 52, and on opposite sides of the plate are nuts 57 and 58, threaded onto the stud. Adjustment of the nuts along the stud varies the tension of the belts.

To provide two different speeds for the lathe, there are two sets of gears continuously driven by the driving shaft 44. The low speed is furnished by a pinion 59 keyed to the driving shaft 44, and meshing with a gear 60 keyed to a clutch sleeve 61, which is loosely mounted on the driven shaft 45. The high speed is furnished by a gear 62, keyed to the driving shaft 44, and meshing with a gear 63, which is keyed to a clutch sleeve 64, loosely mounted on the driven shaft 45.

Any suitable type of clutch may be employed, the one herein shown being a commercially known clutch called "The Johnson Double Clutch", and comprises in addition to the sleeves 61 and 64 an axially shiftable sleeve 65, which overlaps the sleeves 61 and 64. The sleeve 65 carries a wedge block 66, presenting wedges 67 and 68, and this block is suitably secured as by a screw 69 to the sleeve 65. The wedge block is loosely received in and guided by a longitudinal keyway 70 in a sleeve 71, which is keyed to the shaft 45 by a key 72 (see Fig. 5), which also keys two expansible, split rings 73 and 74 (see Fig. 6) to said shaft.

The wedge 67 is received between adjacent ends of a pair of clutch fingers 75, and the wedge 68 is received between adjacent ends of a pair of clutch fingers 76. The clutch fingers 75 are provided with protuberances 77, which afford fulcrums mounted in the expansible and contractible ring 73, and the clutch fingers 76 are provided with similar protuberances 78, similarly related to the expansible and contractible ring 74. When the axially shiftable sleeve 65 is in its neutral position, represented in Fig. 6, neither clutch is engaged, but when either of the rings 73 and 74 is expanded into engagement with the internal surface of the associated sleeve 61, or 64 as the case may be, one sleeve or the other is coupled to and drives the shaft 45.

Shifting of the sleeve 65 is accomplished by providing the latter with a circumferential groove 79, which, as shown in Fig. 5, receives a pair of segmental blocks 80, having trunnions 81 pivotally mounted in arms 82, which are secured as by pins 83 to a rockshaft 84. The rear end of the rockshaft is received in a bearing 85 presented by the housing 42, while the other end of the shaft extends through a bearing 86 presented by the housing.

A lever 87, suitably secured to the front end of the rockshaft, is provided with a downwardly-directed arm 88 and an upwardly directed arm 89. This lever is normally maintained in its neutral position, and is restored thereto by spring-pressed plungers 90 (see Fig. 7), which engage opposite sides of a roller 91 mounted on a stud 92 (see Fig. 5) on the arm 88. Each of the plungers 90 (see Fig. 8) is mounted to slide horizontally in a horizontal bore 93 presented by a guide 94 projecting from the front face of the housing 42. Each plunger is provided with a reduced portion 95, which is encircled by a helically coiled compression spring 96, interposed between the plunger head and a bushing 97, which is threaded into the guide 94, and affords a means of adjustment for the spring.

The clutch operating lever 87 in the present example is operated by hand, and to that end a handle 98 is attached to the lever, as by a pivot 99, and extends through a slot 100 in a plate 101 secured as by a bracket 102 to the under side of the bench. The handle is provided with a downwardly-directed lug 103, which (see Fig. 1) is adapted to enter either of two notches 104 in the plate 101, when the lever is swung to the right or to the left to engage one clutch or the other. Gravitation of the handle causes the lug to enter the notch and lock the lever, thereby to hold the latter at the end of its throw until the operator wishes to release the clutch, which can be accomplished by simply lifting the handle, whereupon the lever is restored to its central position, under the influence of one of the springs 96. When the lever is thrown in one direction, the low speed clutch is engaged, and when it is thrown in the opposite direction, the high speed clutch is engaged.

Having thus described one embodiment of the invention, but without limiting myself thereto, what I claim and desire by Letters Patent to secure is:

1. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley thereon, of a support beneath, spaced from and supporting said bed, power transmitting mechanism below said support and comprising a shaft, bearings for said shaft, and an overhanging pulley on said 75

shaft, outside said bearings and beneath the first-mentioned pulley, and a belt connecting said pulleys, said support being provided with a single opening through which both leads of said belt extend, thereby to permit removal and replacement of said belt to be accomplished by passing said belt bodily through said opening.

2. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley thereon, of a support beneath, spaced from and supporting said bed, power transmitting mechanism below said support and comprising a shaft, bearings for said shaft, and an overhanging pulley on said shaft, outside said bearings and beneath the first-mentioned pulley, and a belt connecting said pulleys, said support being provided with a slot having longitudinal portions through which the leads of said belt extend, and a transverse portion connecting said longitudinal portions.

3. The combination with a lathe comprising a bed, a head-stock, a spindle and a pulley thereon, of a support beneath and spaced from said bed, a pedestal disposed in the space between said bed and said support and supporting said bed on said support, power transmitting mechanism below said support and comprising a shaft, bearings for said shaft, and an over-hanging pulley on said shaft, outside said bearings, and a belt connecting said pulleys, said support being provided with a slot having longitudinal portions through which the leads of said belt extend, and a transverse portion connecting said longitudinal portions, said pedestal being interposed between said longitudinal portions.

4. The combination with a lathe comprising a bed, a head-stock, a spindle and a pulley thereon, of a support beneath said bed, pedestals supporting said bed on said support, power transmitting mechanism below said support and comprising a shaft and an overhanging pulley thereon, a belt connecting said pulleys, said support being provided with a slot having longitudinal portions through which the leads of said belt extend, and a transverse portion connecting said longitudinal portions, one of said pedestals being interposed between said longitudinal portions, and a movable brace normally to reinforce said support between said longitudinal portions of said slot.

5. The combination with a lathe comprising a bed, a head-stock, a spindle and a pulley thereon, of a support beneath said bed, pedestals supporting said bed on said support, power transmitting mechanism below said support and comprising a shaft and an overhanging pulley thereon, a belt connecting said pulleys, said support being provided with a slot having longitudinal portions through which the leads of said belt extend, and a transverse portion connecting said longitudinal portions, one of said pedestals being interposed between said longitudinal portions, and a movable brace beneath said support and normally reinforcing said support beneath said interposed pedestal.

6. The combination with a lathe comprising a bed, a head-stock, a spindle and a pulley thereon, of a support beneath said bed, pedestals supporting said bed on said support, power transmitting mechanism below said support and comprising a shaft and an overhanging pulley thereon, a belt connecting said pulleys, said support being provided with a slot having longitudinal portions through which the leads of said belt extend, and

a transverse portion connecting said longitudinal portions, one of said pedestals being interposed between said longitudinal portions, and a removable brace beneath said support and normally extending across said longitudinal portion of said slot.

7. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley thereon, of a support beneath, spaced from and supporting said bed, power transmitting mechanism below said support and comprising a shaft, bearings for said shaft, and an overhanging pulley on said shaft, outside said bearings, and beneath the first-mentioned pulley, a belt connecting said pulleys, said support being provided with a single opening through which both leads of said belt extend, thereby to permit removal and replacement of said belt to be accomplished by passing said belt bodily through said opening, and means for varying the tension of said belt by raising and lowering said bed.

8. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley thereon, of a support beneath, spaced from and supporting said bed, power transmitting mechanism below said support and comprising a shaft, bearings for said shaft, and an overhanging pulley on said shaft, outside said bearings, and beneath the first-mentioned pulley, a belt connecting said pulleys, said support being provided with a single opening through which both leads of said belt extend, thereby to permit removal and replacement of said belt to be accomplished by passing said belt bodily through said opening, and means for varying the distance between said pulleys by raising and lowering said bed.

9. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley thereon, of a support beneath, spaced from and supporting said bed, power transmitting mechanism below said support and comprising a shaft, bearings for said shaft, and an overhanging pulley on said shaft, outside said bearings, and thereon beneath the first-mentioned pulley, a belt connecting said pulleys, said support being provided with a single opening through which both leads of said belt extend, thereby to permit removal and replacement of said belt to be accomplished by passing said belt bodily through said opening, and vertically adjustable pedestals in the space between said bed and said support.

10. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley, of a support beneath said bed, a pulley beneath said support, a belt connecting said pulleys, and two pedestals supporting said bed on said support, each pedestal comprising two hollow, coaxial members threaded together to vary its height, and clamping means including two members extending from said bed through said hollow members and through said support.

11. The combination with a lathe comprising a bed, a head-stock, a spindle, and a pulley, of a support beneath said bed, a pulley beneath said support, a belt connecting said pulleys, and two pedestals supporting said bed on said support, each pedestal comprising means to vary its height, and one pedestal comprising a flexible connection with said bed, said flexible connection including a socket and a member mounted to rock in said socket.

FREDERICK C. BLANCHARD.

CERTIFICATE OF CORRECTION

Patent No. 2,043,967.

June 9, 1936.

FREDERICK C. BLANCHARD.

It hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 43, claim 9, strike out the word "thereon"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of August, A. D. 1936.

Leslie Frazer

Acting Commissioner of Patents.

(Seal)