No. 673,709. Patented May 7, 1901.

F. B. DUNCAN.

LATHE.

(Application filed Aug. 10, 1900.)

(No Model.) 3 Sheets—Sheet 1.

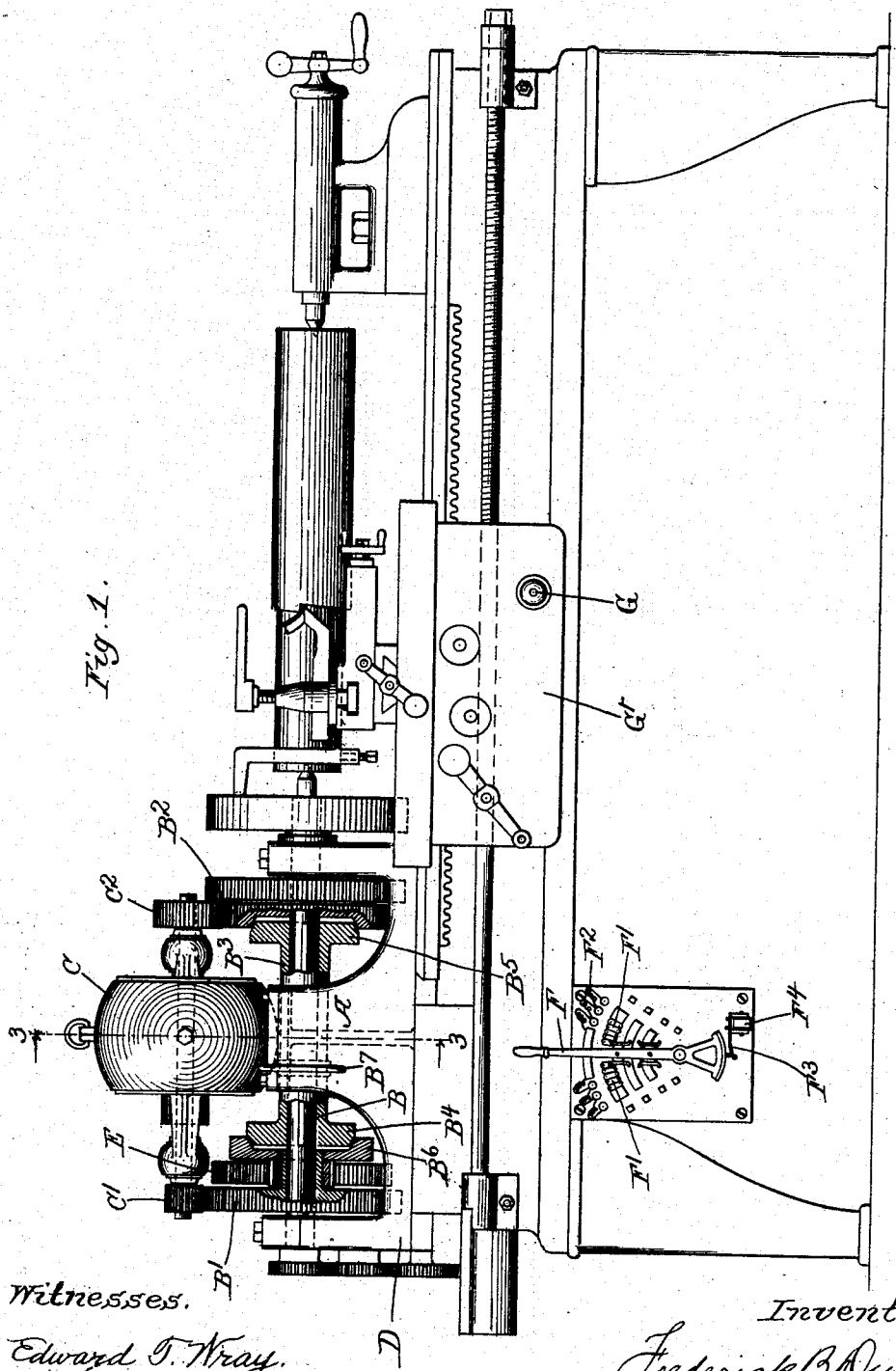


Fig. 1.

Witnesses.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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Fig. 2.

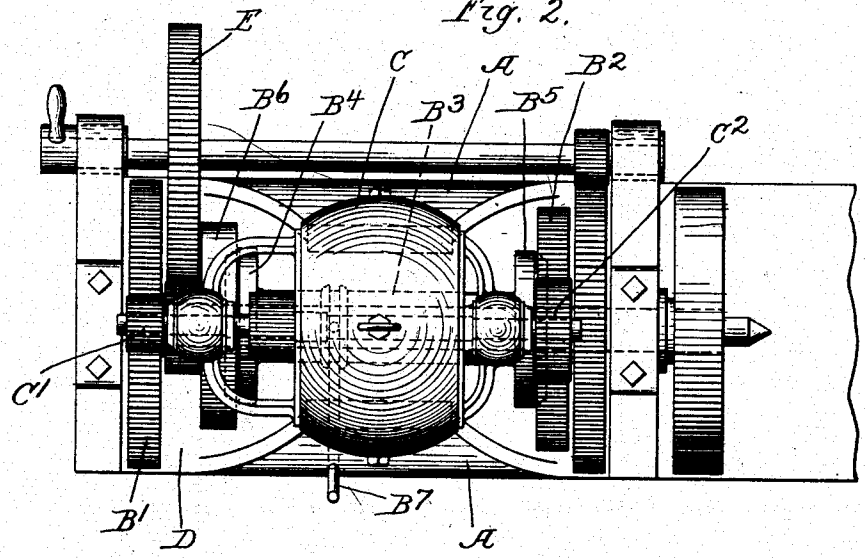
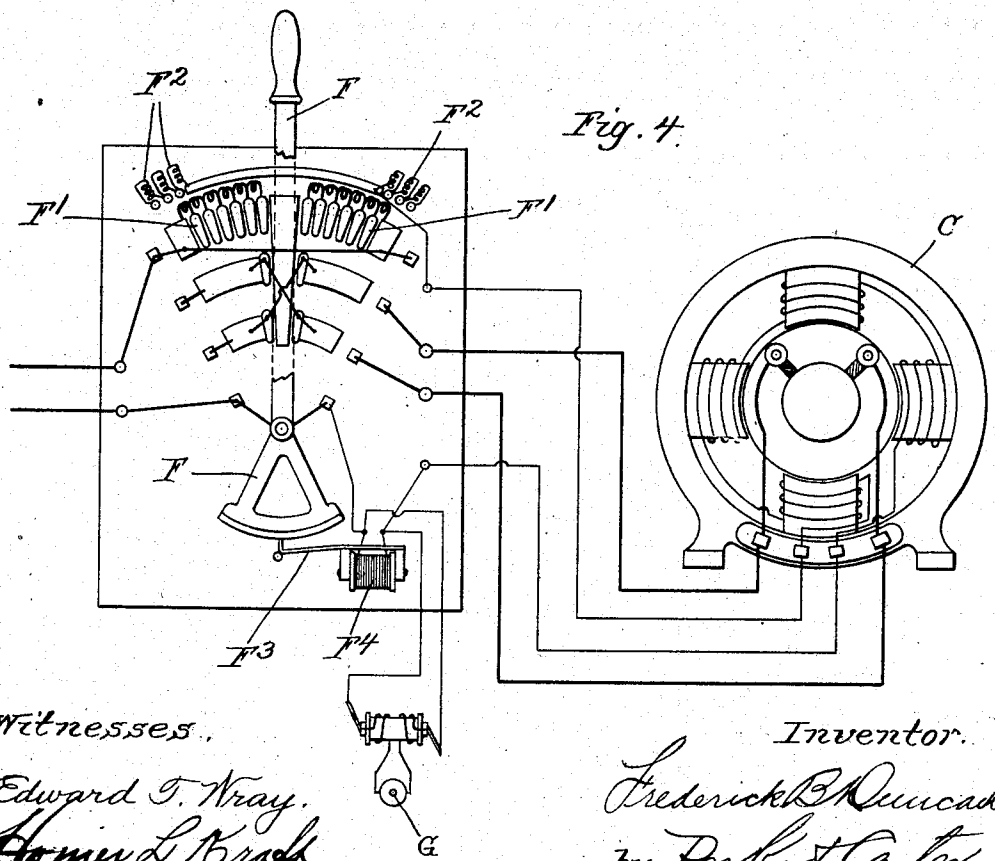


Fig. 4.



Witnesses.

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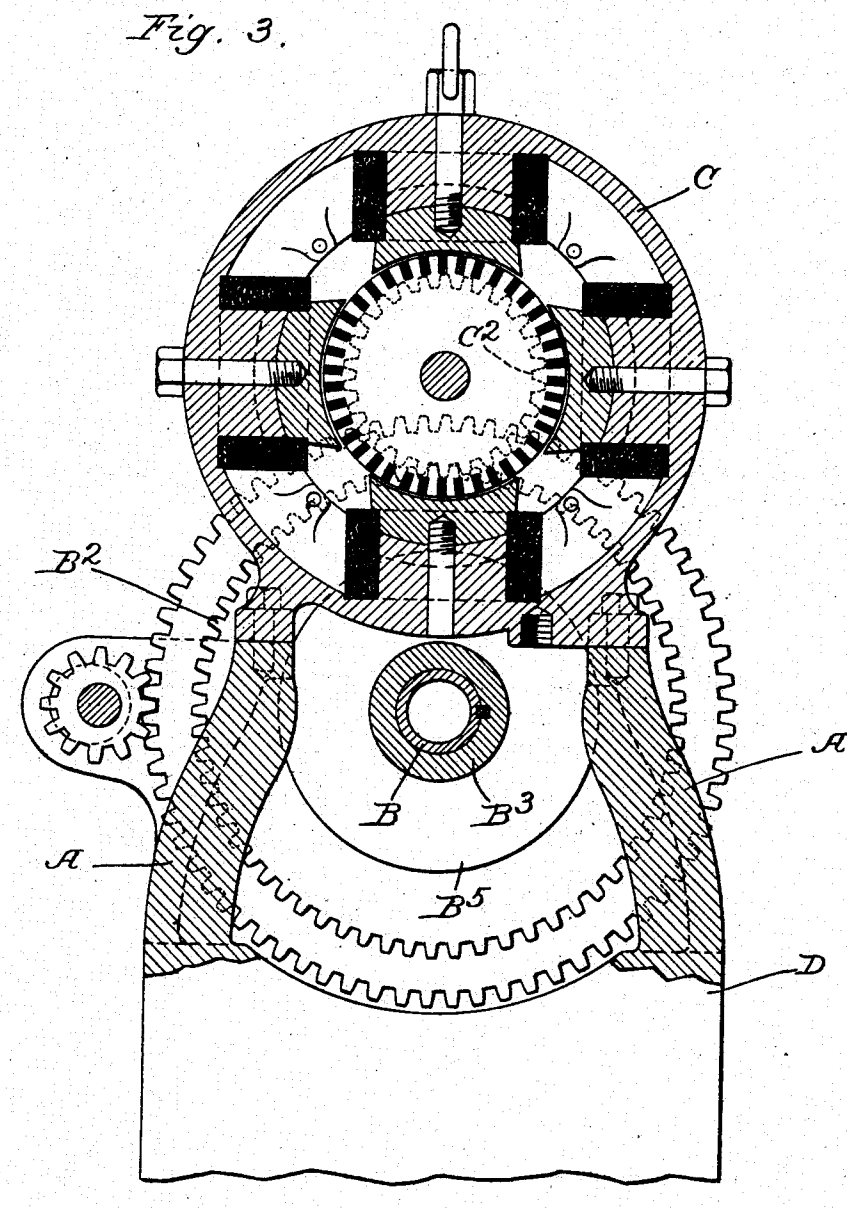
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Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

FREDERICK B. DUNCAN, OF MADISON, WISCONSIN, ASSIGNOR TO THE NORTHERN ELECTRICAL MANUFACTURING COMPANY, OF SAME PLACE.

LATHE.

SPECIFICATION forming part of Letters Patent No. 673,709, dated May 7, 1901.

Application filed August 10, 1900. Serial No. 26,452. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK B. DUNCAN, a subject of the Queen of Great Britain, residing at Madison, in the county of Dane and State of Wisconsin, have invented a certain new and useful Improvement in Lathes, of which the following is a specification.

My invention relates to improvements in lathes, and has for its object to provide a new and improved lathe directly connected to an electric motor.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a device embodying my invention. Fig. 2 is a plan view with parts omitted. Fig. 3 is a section on line 3 3, Fig. 1. Fig. 4 is a diagrammatic view showing the electrical connections with the controller.

Like letters refer to like parts throughout the several figures.

My invention may be applied to lathes of various kinds. As shown in Fig. 1, I provide two supports A A, which are carried in any convenient manner by the lathe-bed, the supports being located on each side of the lathe-spindle B. An electric motor C of any desired construction is mounted upon the supports A and is located above the spindle B, as shown. I prefer to form the supports A by forming projecting parts on the head-stock D of the lathe, one on each side of the spindle. The motor is then rigidly fastened to these projecting parts, so as to be above the lathe-spindle. This construction has many advantages: It permits the use of any design of motor. It permits the motor to be easily and quickly installed and easily and quickly removed if it becomes necessary to repair either the motor or the other mechanism. It very materially strengthens the head-stock, so as to stiffen it and make it more rigid than is the case with the ordinary lathe. This is a feature aimed at by all lathe manufacturers, as it holds the work more rigid between the centers and allows the work to be turned out more rapidly and accurately.

As illustrated in Fig. 1, the motor-shaft is provided with the two pinions C' C^2, which engage, respectively, the gears B' B^2, loosely mounted on the spindle B. A suitable clutch mechanism of any desired construction is provided for connecting either of the gears B' and B^2 with the spindle. I have shown in Fig. 1 a simple construction for this purpose. In this construction a sleeve B^3 is mounted upon the lathe-spindle, so as to rotate therewith, but is adapted to be reciprocated. This sleeve is provided with the clutch members B^4 and B^5, which are adapted to alternately engage the gears B' and B^2 or some part associated therewith, so as to connect them with the lathe-spindle. As herein shown, the clutch member B^5 makes direct frictional contact with the gear B^2 at one end, and B^4 with the clutch member B^6 at the other end, said clutch member B^6 being operatively connected with the gear B'. This connection may be made in any desired manner. As herein shown, the gear B' is provided with a hub or sleeve to which the part B^6 is keyed or otherwise attached. A clutch-lever B^7 is connected with the sleeve B^3, so as to move it. It will thus be seen that a movement of the sleeve in one direction connects the motor to the spindle through the pinion C', and a movement of the sleeve in the other direction connects the motor to the spindle through the pinion C^2. These pinions and gears are arranged so as to produce two different speeds of rotation of the spindle. The lathe is provided with the ordinary back gear E, as shown, so that a further variation in the speed may be obtained.

The motor is provided with a controller, by means of which it may be run at various speeds, and hence it will be seen that a great variation in speed control is obtained. This controller may be of any desired construction and is preferably arranged so that there is a controllable resistance in circuit with the field and with the armature. I have shown this controller diagrammatically in Fig. 4. This controlling device is provided with a controlling-arm F, which is moved along suitable contacts to vary the resistance F' in the armature and the resistance F^2 in circuit with the field-coils. The controlling-arm is held in position by the holding-piece F^3, controlled by the magnet F^4. By means of this controller the speed of the motor itself can be varied through a great range, and hence it

will be seen that when used in connection with the other two speed-controlling devices—namely, the clutch mechanism and the back gear—a great range of speed control is obtained. This range of speed control is of the greatest importance in the operation of the lathe.

Some suitable means is provided whereby the motor may be stopped by the operator without moving from his work. It often happens that the operator gets the tool of the lathe caught or has some other mishap which necessitates his stopping the lathe without leaving the carriage upon which the tool is mounted. This result is obtained in my construction by means of the push-button G. This push-button may be located in any convenient position, and as herein shown is placed on the carriage G'. The push-button is connected in circuit with the magnet F^4, so that when operated said magnet will be short-circuited. In this event the holding-piece is released and the controlling-arm is automatically moved by a spring or other retracting device commonly employed in such constructions to break the circuit through the motor.

I have described in detail a particular construction embodying my invention; but it is of course evident that the parts may be greatly varied in form, construction, and arrangement and that some of the parts may be omitted and others used with parts not herein shown without departing from the spirit of my invention. I therefore do not limit myself to the construction shown.

The use and operation of my invention are as follows: When the motor is in position on the supports A and is rigidly connected thereto, it is ready to be set in operation. The motor is then connected in circuit by means of the controller and is operatively connected with the lathe-spindle by moving the lever B^7 or by the back gear E when the lever B^7 is in an off position. If the lever is moved in one direction, one speed is obtained, and if moved in a different direction a different speed is obtained. A third speed is obtained by means of the back gear. A series of variations in speed is obtained by means of the controller, and this variation may be used in connection with the three variations in speed produced by the clutch mechanism and the back gear. It will therefore be seen that a great range of speed control is obtained. It will further be seen that this construction eliminates all the disadvantages of a counter-shaft, belts, and the like and permits the location of the lathe in the most favorable light and also places the lathe under the perfect control of the operator. This construction also produces great rigidity in the head-stock and spindle and permits any standard motor to be used. If the tool of the lathe gets caught or anything else happens which necessitates stopping the lathe quickly, the operator can instantly stop the lathe by pressing the button G. It will further be noted that this construction does not require any change in the lathe-bed, nor does it enlarge the lathe laterally, so that greater space is required. It will further be noted that by this means a symmetrical, efficient, and desirable construction is obtained. I have shown the projecting parts on the head-stock as projecting upwardly, and I prefer this position; but it is of course evident that they might project in the reverse direction, if desired.

I claim—

1. A self-contained lathe, comprising a horizontal spindle, two supports, one located on each side of said spindle, a direct-connected electric motor above the spindle and removably mounted upon said supports, the armature-shaft of said motor substantially parallel to said spindle and directly connected therewith.

2. A lathe, comprising a spindle, a head-stock therefor, two projecting parts on said head-stock, one on each side of said spindle, a motor carried or supported by said projecting parts and having an armature-shaft substantially parallel to said spindle, said motor spanning the space between said two projecting parts, so as to be in the vertical plane through said spindle, the armature-shaft of the motor directly connected with said spindle.

3. A lathe, comprising a spindle, a head-stock therefor, a direct-connected electric motor mounted upon said head-stock, a controller for said motor, and means independent of and separate from said controller for stopping the motor, substantially as described.

4. A lathe, comprising a spindle, two supports, one on each side of said spindle, a motor above the spindle and mounted upon said supports, said motor operatively connected with the spindle, a sleeve connected with the spindle so as to rotate therewith, but free to move therealong, and provided at each end with a clutch member, two opposed clutch members, one at each end of said sleeve, said members connected respectively with suitable gears, and means for connecting said gears to the shaft of the motor.

5. A lathe, comprising a spindle, a head-stock therefor, two projecting parts integral with said head-stock, one on each side of said spindle, a motor above the spindle and removably connected with said projecting parts, the shaft of said motor adapted to be operatively connected with the spindle at two different points, and a clutch mechanism between said projecting parts of the head-stock adapted to control these two connections.

6. A lathe, comprising a spindle, two supports, one on each side of said spindle, a motor above the spindle and mounted upon said supports, a motor-shaft having two pinions, one on each side of the motor, said pinions being connected to independent rotatable parts mounted on said spindle, and means for alternately connecting said rotatable parts

with the spindle, so that it may be driven from either end of the motor-shaft.

7. A lathe, comprising a spindle, a motor above the spindle and mounted in proximity to said spindle, a motor-shaft having two pinions, one on each side of the motor, said pinions being connected to independent rotatable parts mounted on said spindle, means for alternately connecting said rotatable parts with the spindle, so that it may be driven from either end of the motor-shaft and at variable speeds, a back gear adapted to be connected with the spindle, so as to produce another variation in speed, and a controlling device for the motor adapted to be operated to drive the motor at various speeds, whereby a great range of speed control is obtained.

FREDERICK B. DUNCAN.

Witnesses:
AUGUST J. BUENZLI,
ALBERT B. DEAN.