No. 640,281. Patented Jan. 2, 1900.

J. F. DOWDING.

LATHE.

(Application filed Nov. 6, 1899.)

(No Model.) 3 Sheets—Sheet 1.

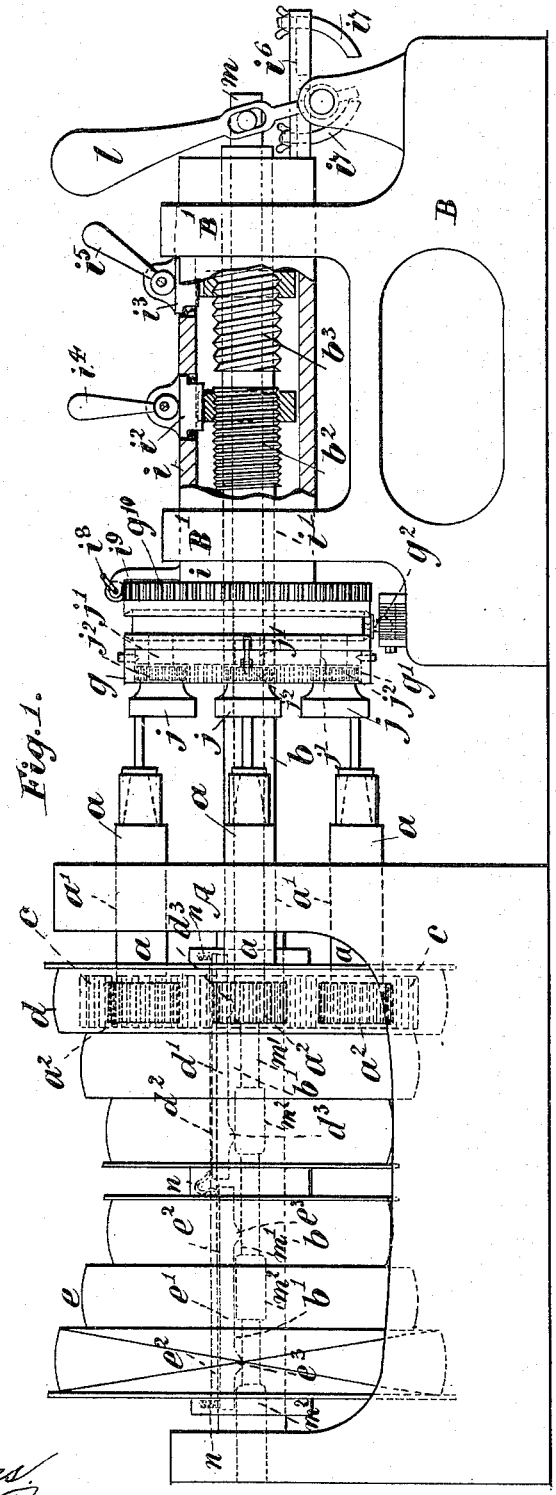

Fig. 1.

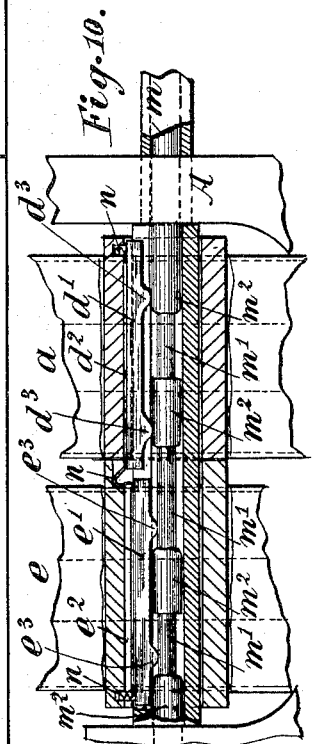

Fig. 10.

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Nellie Callahan.

Inventor,
James Francis Dowding
by Wm. F. Sinnott
his Atty.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

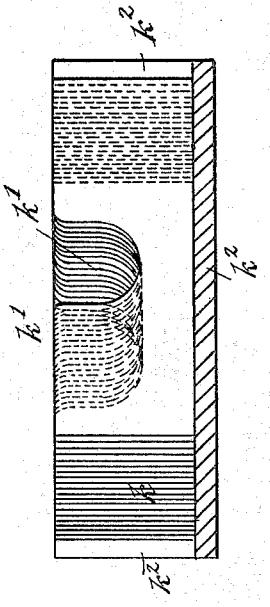


Fig. 3.

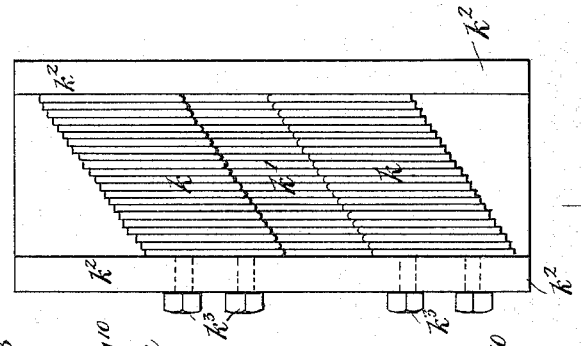


Fig. 5.

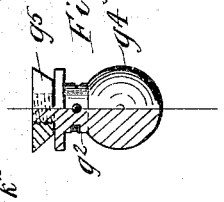
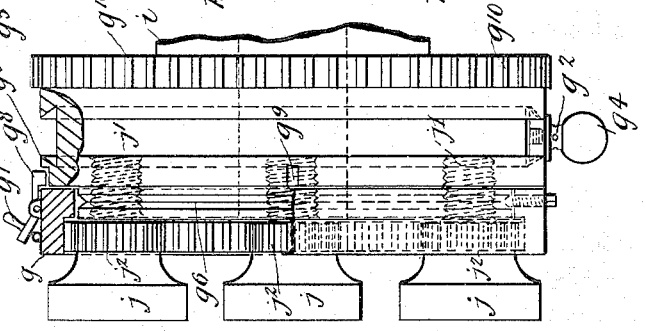


Fig. 2.



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Ed Fincnel.
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No. 640,281. Patented Jan. 2, 1900.

J. F. DOWDING.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 8.

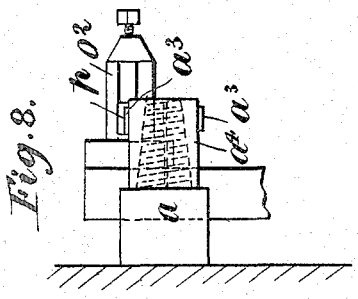


Fig. 9.

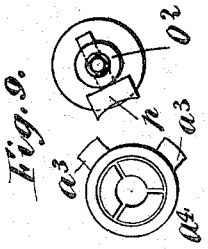


Fig. 7.

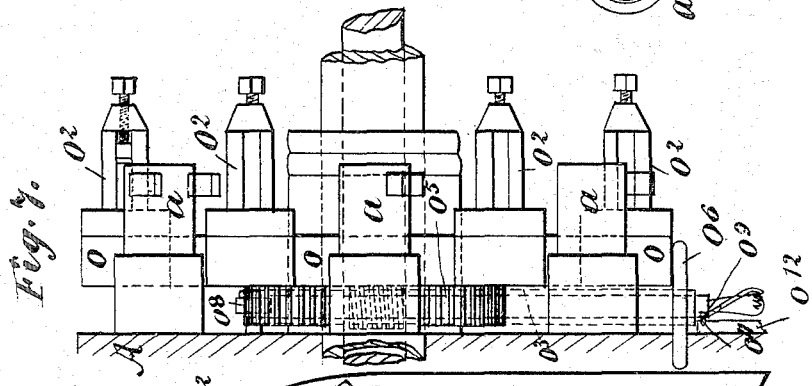
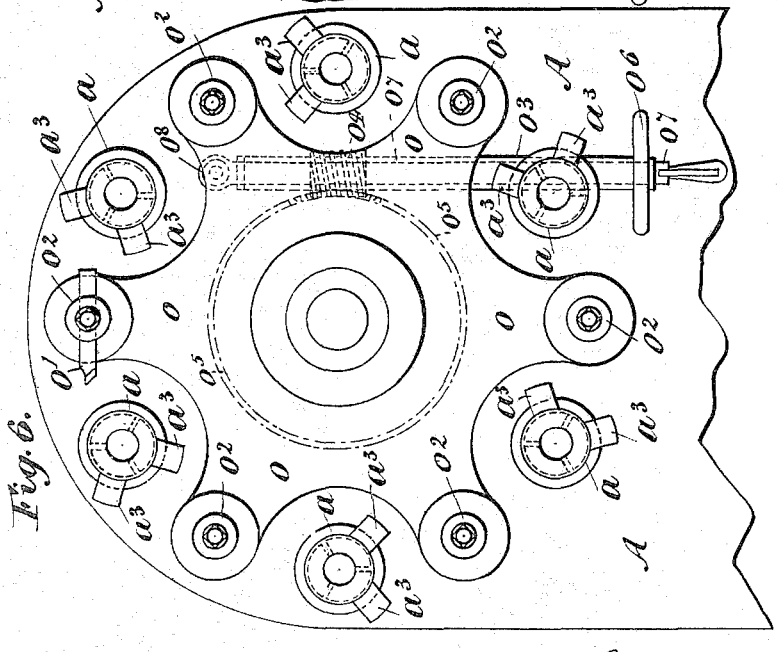


Fig. 6.



Witnesses.
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Nellie Callahan

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James Francis Dowding.
by W. H. Finckel
his Atty.

UNITED STATES PATENT OFFICE.

JAMES F. DOWDING, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF TO HARRY ORME MASCALL, OF SAME PLACE.

LATHE.

SPECIFICATION forming part of Letters Patent No. 640,281, dated January 2, 1900.

Application filed November 6, 1899. Serial No. 736,039. (No model.)

To all whom it may concern:

Be it known that I, JAMES FRANCIS DOWDING, a subject of the Queen of Great Britain, residing at Wood Green, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Lathes, of which the following is a full, clear, and exact description, and for which I have made application for British patent, dated the 10th day of March, 1899, in respect of which application no patent has yet been granted.

The invention relates to a multiple-spindle lathe designed to turn, bore, screw, cut, and do all such like work usually done on an ordinary single spindle or mandrel lathe.

The apparatus is shown in the accompanying drawings, in which—

Figure 1 is an elevation of a complete lathe, partly in section. Fig. 2 is an enlarged view of the tool-boxes and means for operating the same. Figs. 3 and 4 are a plan and section, to a still larger scale, of the former used to operate the tool-boxes. Fig. 5 is a detail view, partly in section, of a projection or guide used in connection with the former. Fig. 6 is a face view of a plate fitted to the face of the head-stock, carrying tools for such operations as facing, recessing, and parting off; and Fig. 7 is an elevation of the same. Fig. 8 is a detail view of part of the plate fitted to the face of the head-stock, one chuck, and a cam or wiper carried by said plate for gripping or releasing the work. Fig. 9 is a front view of the cam or wiper and the chuck shown in Fig. 8. Fig. 10 is a section showing more clearly the key-operating shaft, keys and keyways in the main shaft, and cone-pulleys.

The chuck-spindles a, six of which are shown in the drawings, are arranged in suitable bearings a' in the head-stock A, at equal distances from the center of the main shaft b. Each of these spindles a has a pinion a^2 fitted thereto, which pinions gear into an internally-toothed wheel c, fixed to or forming part of the open-belt cone-pulley d, from which they receive their motion. There is also a cross-belt cone-pulley e for reversing. Said pulleys d and e operate on the main shaft b alternately by means of automatic keys d' e', working in keyways b' in the shaft b and d^2 e^2 in the cone-pulleys d and e, respectively. These automatic keys d' e' connect and disconnect first one cone-pulley and then the other with the main shaft b at each end of the stroke of the tool-head. The tool-head consists of a disk or face-plate g, fixed to or fitted so that it may revolve on a hollow mandrel i, which is free to slide in suitable bearings B′ in the saddle B of the lathe. Said tool-head is fitted with tool-boxes j, corresponding to the number of chuck-spindles a. These tool-boxes j are revolved on studs j' in the tool-head by means of pinions j^2 on their peripheries gearing into an internally-toothed wheel g', mounted on a spigot g^6 in the disk or face-plate g, which may be worked by a handle g^7, operating upon a spring-catch g^8 on the internally-toothed wheel g', which catch enters notches g^9 on the disk or face-plate g.

The disk or face-plate g is fitted with a projection or guide g^2, which may be adjusted around its periphery in an undercut groove g^3 and fixed at any point thereof by screwing the head g^4 into the nut g^5, and thus nipping the overhanging edges of the groove g^3. This guide g^2 works in the slot k' of an adjustable former k, consisting of a number of plates of metal held in a frame k^2 by means of set-screws k^3. As the tool-head is fed forward the projection or guide g^2 is acted upon by the slot k' of the former k, which causes the head to partly revolve on its bearing, by which means any required figure may be produced on the work. The former is seated on the saddle or tail-stock of the lathe, as shown. A worm-wheel g^{10} is mounted on the rear of the tool-head, and a worm i^8, operated by hand and carried by an arm i^9, gears therewith, by which means the tool-head may be rotated to adjust the depth of the cut.

To impart feeding motion to the tool-head, the main shaft b is carried through from the head-stock A, running in suitable bearings i' in the tool-head mandrel i. To effect the endwise motion of the tool-head mandrel i, and consequently of the tool-head, the main shaft b is fitted with one or more screw-threaded "hubs" b^2 b^3, with which coöperate drags or nuts i^2 i^3, which are capable of being thrown into and out of action by eccentric levers and blocks i^4 i^5 or by other suitable means, as is well understood. The

hollow mandrel i has a projection i^6, fitted with adjustable stops i^7, which may be adjusted to determine the length of stroke of the mandrel i, and which by coming into contact with a weighted lever l or other suitable device at the end of the key-operating shaft or plunger m reverses the motion of the machine, except the chuck-spindles a, which receive rotary motion from the internally-toothed wheel c.

For the purpose of reversing, the keys d' e' are each formed with projections d^3 e^3, and the key-operating shaft or plunger m is formed with portions m' of smaller diameter than that of the rest of the shaft. This difference in diameters may be formed by turning down part of the shaft m or by fitting sleeves m^2 thereon. When the shaft m is moved endwise in either direction, the projections or sleeves m^2 raise one of said keys—say d'—into the keyway d^2 of its cone-pulley and permit the other key e' to be moved out from its keyway e^2 in the other cone-pulley, as shown in the drawings. Springs n are used to act upon said keys in the reverse direction to that effected by the key-operating shaft or plunger m.

On the face of the head-stock A is fitted a plate o, which contains tools o', carried by suitable tool-holders o^2 for such operations as facing, recessing, or parting off. This plate o may be operated by means of the hollow shaft o^3, having a worm o^4 gearing with a toothed wheel o^5, as shown in Figs. 6 and 7. A hand-wheel o^6 is attached to the hollow shaft o^3, which latter is carried by a rod o^7, pivoted at o^8. A catch o^9, working in a notch o^{11} in a piece o^{12}, keeps the shaft o^3 in gear with the toothed wheel o^5; but when it is desired to operate the plate o more rapidly the catch o^9 is withdrawn from its notch by means of the hand-lever o^{10} and the worm o^4 on the shaft o^3 is moved out of gear with the toothed wheel o^5, when the plate o and tools o' may be moved by hand.

In some cases the tool-holders o^2 may carry cams or wipers p, which come into contact with the studs a^3 on the conical nuts a^4, which by screwing onto and off the split chucks grip or release the work held therein.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a lathe, the combination of a head-stock, a hollow main shaft, a keyway therein, an open-belt pulley and a cross-belt pulley mounted on the main shaft, keyways formed in the interior of the pulleys, two keys working in said keyways and having projections, springs to press said keys toward the main shaft, a key-operating shaft arranged in the interior of the main shaft, and projections and recesses on the key-operating shaft to act on the projections of the keys, substantially as set forth.

2. In a lathe, the combination of a head-stock, a hollow main shaft, a keyway therein, an open-belt pulley and a cross-belt pulley mounted on the main shaft, keyways formed in the interior of the pulleys, two keys working in said keyways, projections on said keys, springs to press the keys toward the main shaft, a key-operating shaft arranged in the interior of the main shaft, projections and recesses on the key-operating shaft to act on the projections of the keys, a weighted lever acting to move the key-operating shaft endwise, and adjustable stops mounted on the tool-head mandrel and acting on said lever, substantially as set forth.

3. In a multiple-spindle lathe, the combination of a head-stock, a hollow main shaft, a keyway therein, an open-belt pulley and a cross-belt pulley mounted on the main shaft, an internally-toothed wheel fixed within one of said belt-pulleys, a plurality of chuck-spindles carried by bearings in the head-stock, toothed pinions fixed to the chuck-spindles, a keyway formed in each of said pulleys, two keys, projections on said keys, springs to press the keys toward the main shaft, a key-operating shaft arranged in the interior of the main shaft, projections and recesses on the key-operating shaft, a weighted lever acting to move the key-operating shaft endwise, and adjustable stops on the tool-head mandrel acting on said lever, substantially as set forth.

4. In a multiple-spindle lathe, the combination of a head-stock, a hollow main shaft, two pulleys mounted on said shaft, means for keying either pulley to said shaft, with a tool-head carried by a hollow mandrel and having a number of tool-boxes mounted on spindles in a disk or face-plate, toothed pinions fixed to said spindles, an internally-toothed wheel carried by the disk or face-plate gearing with said pinions, and a projection or guide adjustably attached to the tool-head working in a fixed former, substantially as set forth.

5. In a multiple-spindle lathe, the combination of a head-stock, a hollow main shaft passing through the machine, open and cross belt pulleys mounted on the main shaft, means for keying either pulley to main shaft, an internally-toothed wheel fixed to the open-belt pulley, a number of pinions fixed to the chuck-spindles, a plate pivoted on the face of the head-stock, a number of tool-holders carried by said plate, and means for rotating the plate by a worm and worm-wheel or by hand, substantially as set forth.

6. In a lathe having a number of chuck-spindles parallel to the main driving-shaft and receiving motion by means of pinions fixed to said spindles and an internally-toothed gear-wheel mounted on the open-belt pulley, the combination therewith of a plate pivoted to the face of the head-stock having a number of cams or wipers acting against studs on the conical nuts to simultaneously grip and release the work, substantially as set forth.

7. In a multiple-spindle lathe, the combination of a hollow main shaft, keyways in

said shaft, belt-pulleys on said shaft having keyways therein, keys having projections, a shaft or plunger located in the interior of said main shaft, a tool-head carrying a number of tool-boxes, a hollow mandrel carried by bearings in the saddle or tail-stock of the lathe, screw-hubs on main shaft, and drags or nuts capable of being thrown into and out of action for moving the hollow mandrel, a projection on the hollow mandrel having adjustable stops, a weighted lever operated by said stops and acting upon the key-operating shaft or plunger, substantially as set forth.

8. In a multiple-spindle lathe, the combination of a hollow main shaft, keyways in said shaft, belt-pulleys on said shaft having keyways therein, keys having projections, a key-operating shaft or plunger located in the interior of said main shaft, a plurality of chuck-spindles carried by bearings in the head-stock, toothed pinions fixed to the chuck-spindles, an internally-toothed wheel fitted to one of the pulleys and gearing with said toothed pinions, a plate pivoted to the face of the head-stock, a number of tool-holders carried by said plate, a tool-head carrying a number of tool-boxes, a projection or guide adjustably attached to the tool-head working in a fixed former, a hollow mandrel carried by bearings in the saddle or tail-stock of the lathe by which the tool-head is carried, screw-hubs on the main shaft, and drags or nuts capable of being thrown into and out of action for moving the hollow mandrel, a projection on the hollow mandrel having adjustable stops, and a weighted lever operated by stops and acting upon the key-operating shaft or plunger, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

J. F. DOWDING.

Witnesses:

CLAUDE K. MILLS,

WM. GIRLING.