(No Model.)

2 Sheets—Sheet 1.

J. BROWNING.

MACHINE TOOL.

No. 548,175. Patented Oct. 22, 1895.

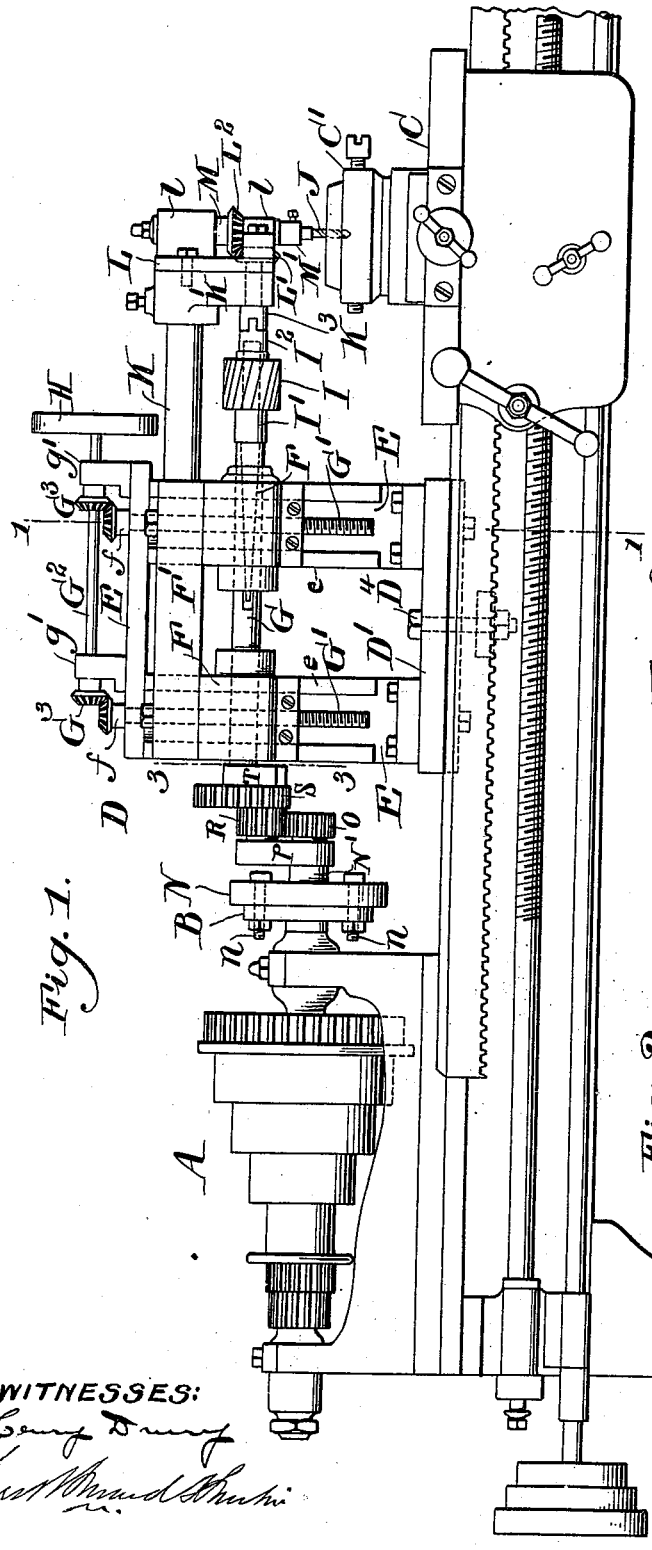


Fig. 1.

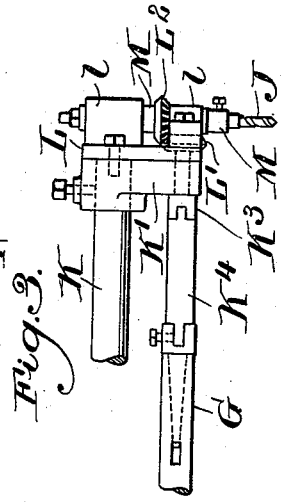


Fig. 3.

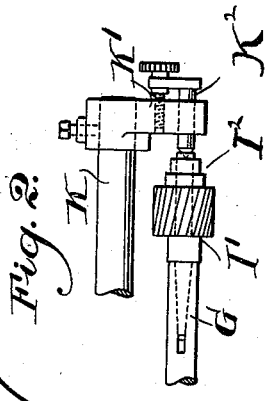


Fig. 2.

WITNESSES:

INVENTOR:

Joseph Browning,

By his attorney,

(No Model.)

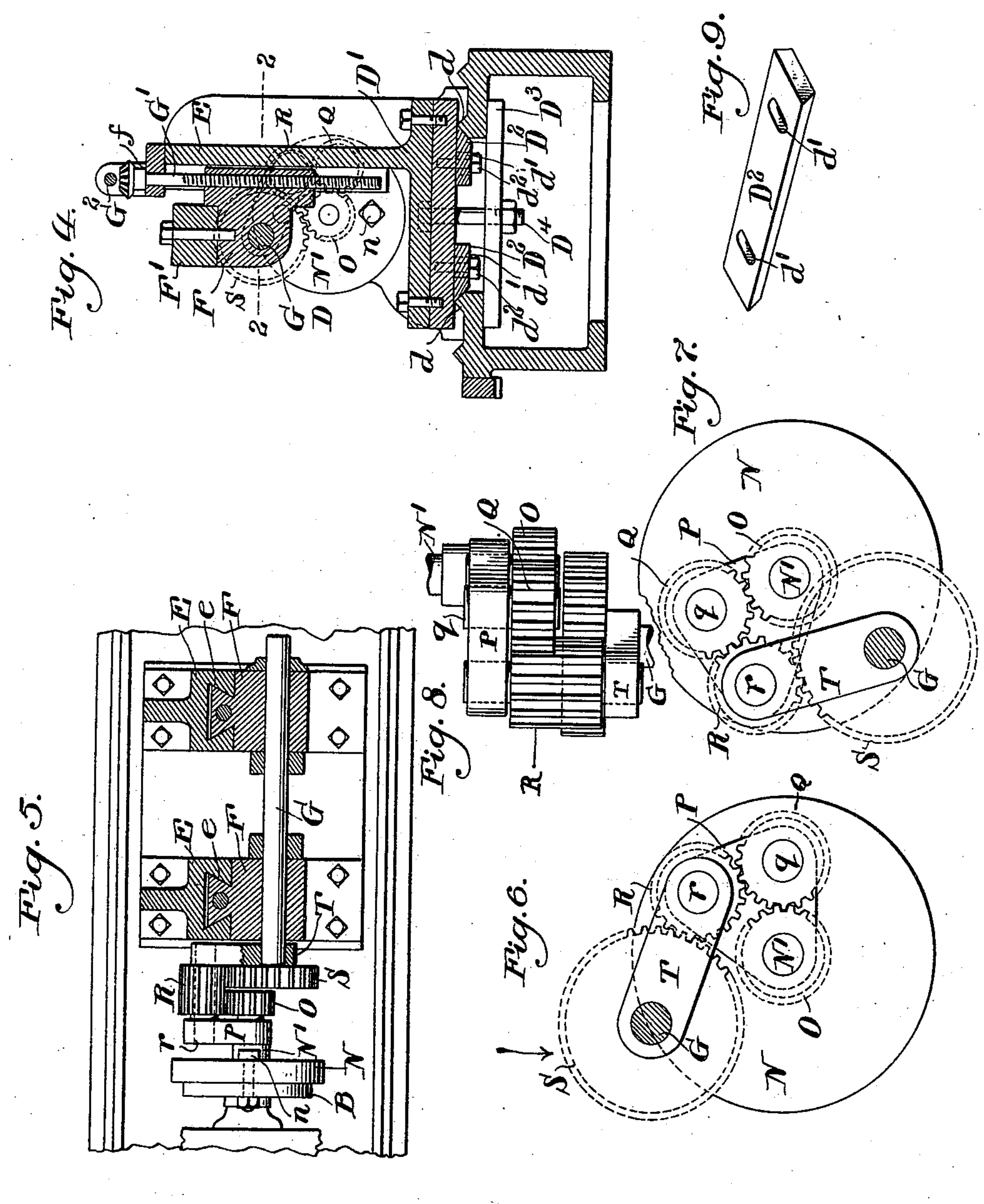
2 Sheets—Sheet 2.

J. BROWNING.

MACHINE TOOL.

No. 548,175.

Patented Oct. 22, 1895.



WITNESSES:

Henry Drury

[illegible]

INVENTOR:

Joseph Browning,

By his attorney,

[illegible]

ANDREW B. GRAHAM, PHOTO-LITHO. WASHINGTON, D.C.

UNITED STATES PATENT OFFICE.

JOSEPH BROWNING, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE-TOOL.

SPECIFICATION forming part of Letters Patent No. 548,175, dated October 22, 1895.

Application filed January 14, 1895. Serial No. 534,738. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BROWNING, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Machine-Tools, of which the following is a specification.

My invention relates to machine-tools; and it consists of certain improvements, which are fully set forth in the following specification, and are shown in the accompanying drawings.

My apparatus is especially adapted to be applied to an ordinary lathe for the purpose of operating a suitable tool, either on a horizontal or on a vertical axis, such as a milling-tool, router, or drill.

By the use of my attachment an ordinary lathe may be transformed at will into a machine for milling, routing, drilling, &c., thus rendering it unnecessary to employ in a machine-shop a number of separate expensive machines for performing these different classes of work.

The apparatus may be made adjustable to suit lathes of different sizes.

In the accompanying drawings, Figure 1 is a front elevation of a lathe having my attachment applied. Fig. 2 is a detail front elevation of the milling-tool and supports. Fig. 3 is a similar view of the routing-tool. Fig. 4 is a transverse vertical sectional view on the line 1 1 of Fig. 1. Fig. 5 is a horizontal sectional view on the line 2 2 of Fig. 4. Fig. 6 is a transverse vertical sectional view on the line 3 3 of Fig. 1, on an enlarged scale. Fig. 7 is a similar view showing the parts in a different position. Fig. 8 is an enlarged plan view of the driving connections between the lathe and attachment. Fig. 9 is a perspective view of one of the guide-plates for adjusting the attachment to the bed-plate of the lathe.

A is the lathe, which may be of ordinary construction. B is the face-plate thereof, carried by the live-spindle.

C is the slide which carries the work-holder C′.

D is the lathe attachment by which power is received from the lathe-mandrel and transmitted to the tool.

D′ is the base-plate of the attachment, by which the device is supported upon the bed of the lathe.

To enable the attachment to be applied to lathes of different sizes, I prefer to employ a flat base-plate with adjustable bevel-edged plates D^2, adapted to be secured to the face of the base D′ and to fit upon the beveled faces of the usual guide-ribs *d* of the lathe-bed A′. (See Figs. 4 and 9.)

The plate D^2 may be adjustably secured by means of the slots *d′* and screws d^2.

D^3 is a clamp-plate under the lathe A′, to which the base D′ is secured by bolt D^4.

E is an upright frame carried by the base D′ and is provided with vertical guides *e*.

F are slides working vertically in the guides *e e*. They are preferably connected together by a cross-piece F′. The slides F constitute vertically-movable bearings for the shaft G, which is journaled in them.

G′ G′ are adjusting-screws extending vertically through threaded sockets in the slides F F and journaled in bearings *f* in the frame E.

G^2 is a horizontal shaft journaled in suitable bearings *g′* on the frame E and having power-transmitting connection with the adjusting-screws G′ G′, as by the bevel-gears G^3.

H is a hand-wheel on the shaft G^2, by means of which it may be turned to operate the screws G′ and thus raise or lower the slides F and shaft G. Other means of adjusting the shaft G may be employed.

The tool is operated by the shaft G and is so connected that it will be raised or lowered with reference to the work by the raising and lowering of the shaft in the manner described.

In Fig. 1 I have shown both a milling-tool and a router J applied to the apparatus; but in Figs. 2 and 3 I have shown these two tools separately applied.

K is an end extension carried by the slides F F and moving therewith.

K′ is a pendant on the extension K.

The milling-tool I is secured to the shaft G, so as to be driven thereby in any suitable manner.

In Fig. 2 of the drawings I have shown the tool on a spindle I′, clamped to the end of the shaft and held on the spindle by a nut I^2.

K^2 is a center carried by the pendant K′ and acting as a bearing for the spindle I′.

In Fig. 1 I have shown a short shaft K journaled in the pendant K′ and engaging the nut I^2.

For operating a router J or drill which is to be turned on a vertical or upright axis I employ an upright shaft M, journaled in suitable bearings *l* in a frame L, adapted to be fastened to the face of the pendant K′. The shaft M carries the tool-stock M′, in which the tool J is inserted.

L′ L^2 are bevel-gears on the shaft K^3 and M, respectively, by which motion is transmitted from the shaft G to the shaft M and tool J.

In Fig. 3 I have shown the shaft K^3, connected with the shaft G by the short section K^4, while in Fig. 1, in which both the tools I and J are present, the connection is made through the nut I^2 and the spindle I′.

Power is imparted to the shaft G from the lathe by suitable power-transmitting connections, and as the shaft G is to be raised and lowered these connections are adjustable in order that the transmission of power may not be affected by the movement of the vertical shaft G.

N is a plate adapted to be secured to the face-plate B of the lathe, as by the bolts *n*. The plate N, carries a central stud N′, on which is mounted a gear-wheel O.

P is a plate loosely journaled on the stud N′ and carrying a short stud *g*, on which is loosely journaled a gear Q, gearing with the gear O.

R is a second gear, loosely journaled on a short stud *r* on the plate P, which gears with the gear Q.

S is a gear-wheel on the end of the shaft G, which gears with the wheel R.

T is a link connecting the shaft G with the stud *r* of the gear R.

When the shaft G is raised or lowered and the gear S rises or falls, the link T pulls the gear R through the arc of a circle described from the stud N′ as a center. This movement of the gear R is permitted by the rocking plate P, which rocks on the stud N′. As the plate P thus rocks the intermediate gear Q moves with it about the periphery of the gear O, without breaking the gearing connection. Thus the gear S may be raised and lowered without breaking the power-transmitting connections.

Fig. 6 shows the position of the gears with the shaft G elevated, and Fig. 7 shows the position when the shaft G′ is lowered.

If desired, the intermediate gear Q may be omitted and the gear R may engage both the gears O and S. The gear Q serves to change the direction of rotation of the gear-wheel S and shaft G.

The apparatus may be disconnected from the lathe, when desired, by simply disconnecting the plate N, unclamping the base D′, and lifting the entire attachment from the lathe.

The machine is thus adapted to be easily applied to any ordinary lathe, and by employing the adjustable plates D^2 it may be adapted to suit lathes of different sizes.

The particular character of the tool operated by the machine is, of course, immaterial to the invention. I have shown a milling-tool and router, applied separately or together, because those tools illustrate the operation of instruments on horizontal and vertical axes.

The work will be carried in an ordinary carriage C and may be moved longitudinally, transversely, or in other directions, either by hand or power, in the manner now customary in moving the work in lathes.

I do not limit myself to the details of construction shown and described, as it is apparent that they may be varied in many ways without departing from the invention.

While I have described and illustrated my improvement as applied to a lathe, it is apparent that it may be applied to other machines without in any way departing from the invention.

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

1. A machine tool for attachment to lathes, &c. consisting of a frame adapted to be applied to the frame of the lathe and provided with a guide or guides in a position transverse to the spindle of the lathe, an adjustable frame movable in said guides, a tool operating shaft carried by said frame in a position parallel with the lathe spindle, and automatically adjustable driving connections between the tool operating shaft and a driven part of the lathe.

2. A machine tool for attachment to lathes, &c. consisting of an independent frame adapted to be applied to the frame of the lathe, an adjustable frame carried thereby, a tool driving shaft carried by the adjustable frame in a position parallel with the lathe spindle and automatically adjustable power transmitting connections between the tool driving shaft and a driven part of the lathe, whereby the said driving connections will automatically adjust themselves to suit the adjustment of the tool shaft with the frame which carries it.

3. An attachment for lathes &c., consisting of an independent frame adapted to be applied to the frame of the lathe, and having a vertical guide or guides, an adjustable frame movable in said vertical guides, a tool operating shaft carried by said adjustable frame, and automatically adjustable power transmitting connections between the tool operating shaft and a driven part of the lathe.

4. In an attachment for lathes &c., the combination with the adjustable tool operating shaft, of the automatically adjustable power transmitting connections, consisting of the gear O adapted to be connected with a driven part of the lathe, the gear S on the adjustable tool operating shaft, and intermediate gearing between the gears O and S connected with each by a link connection.

5. In an attachment for lathes, &c. the combination with a tool operating shaft having a vertical adjustment, of a gear wheel carried

by said shaft, a stationary driving gear, and intermediate gear meshing with the stationary driving gear and movable in an arc described from the center of the stationary driving gear, and a second intermediate gear between the first intermediate gear and the gear wheel of the tool operating shaft moving with said intermediate gear in an arc described from the center of the gear wheel of the tool operating shaft, whereby the tool operating shaft and its gear wheel may be adjusted vertically without breaking the driving connection with the stationary driving gear.

6. The combination of a vertically adjustable frame, a tool operating shaft carried thereby, a gear wheel carried by said tool operating shaft, a stationary driving gear, and intermediate gearing between the gear wheel of the tool operating shaft and stationary driving gear, said intermediate gearing being movable to maintain the driving connection when the gear wheel of the tool operating shaft is adjusted.

7. In an attachment for lathes &c., the combination of a frame, a horizontal shaft, adjustably movable bearings for said shaft carried by the frame, by the adjustment of which the horizontal shaft may be raised and lowered with reference to the work, and automatically adjustable gearing between the horizontal shaft and the spindle of the lathe.

8. In an attachment for lathes, &c. the combination of a frame adapted to be applied to the frame of a lathe and provided with a guide or guides in a position transverse to the spindle thereon, an adjustable frame movable in said guides, a shaft occupying a position parallel with the lathe spindle carried by said frame, a tool operating shaft also carried by said frame in a position transverse to the first shaft, power transmitting connections between said shafts, and automatically adjustable power transmitting connections between the first shaft and a driven part of the lathe.

9. The combination of a suitable base frame adapted for attachment to a lathe, or similar machine, and provided with a vertical guide or guides, a vertically adjustable frame carried thereby, and movable in said guide or guides, a vertical tool operating shaft carried by the adjustable frame, and automatically adjustable power transmitting connections between the vertical tool operating shaft and a driven part of the lathe.

10. In an attachment for lathes &c., the combination of a suitable base frame, having a vertical guide or guides, a vertically adjustable frame carried thereby, and movable in said guide or guides, a horizontal shaft carried by the adjustable frame, power transmitting connections between the horizontal shaft and a driven part of the lathe, a vertical tool operating shaft carried by the adjustable frame, and power transmitting connections between the horizontal shaft and vertical tool operating shaft.

11. In an attachment for lathes &c. the combination of a suitable base frame, having a vertical guide or guides, a vertically adjustable frame carried thereby, and movable in said guide or guides, a horizontal shaft carried by the adjustable frame, power transmitting connections between the horizontal shaft and a driven part of the lathe, a detachable frame carried by the vertically adjustable frame, a vertical tool operating shaft carried by the detachable frame, and power transmitting connections between the horizontal shaft and vertical tool operating shaft.

12. The combination with a lathe having a spindle journaled in fixed bearings and a machine tool detachably secured to the bed of the lathe and provided with a frame and with an adjustable tool operating shaft carried by said frame, of automatically adjustable power transmitting connections between the tool operating shaft of the machine tool and the spindle of the lathe to which the machine tool is applied; whereby the tool operating shaft may be adjusted to adjust the tool carried by it with reference to the work without breaking the driving connections, substantially as described.

In testimony of which invention I have hereunto set my hand.

JOSEPH BROWNING.

Witnesses:

ERNEST HOWARD HUNTER,

WM. L. EVANS.