No. 815,733. PATENTED MAR. 20, 1906.

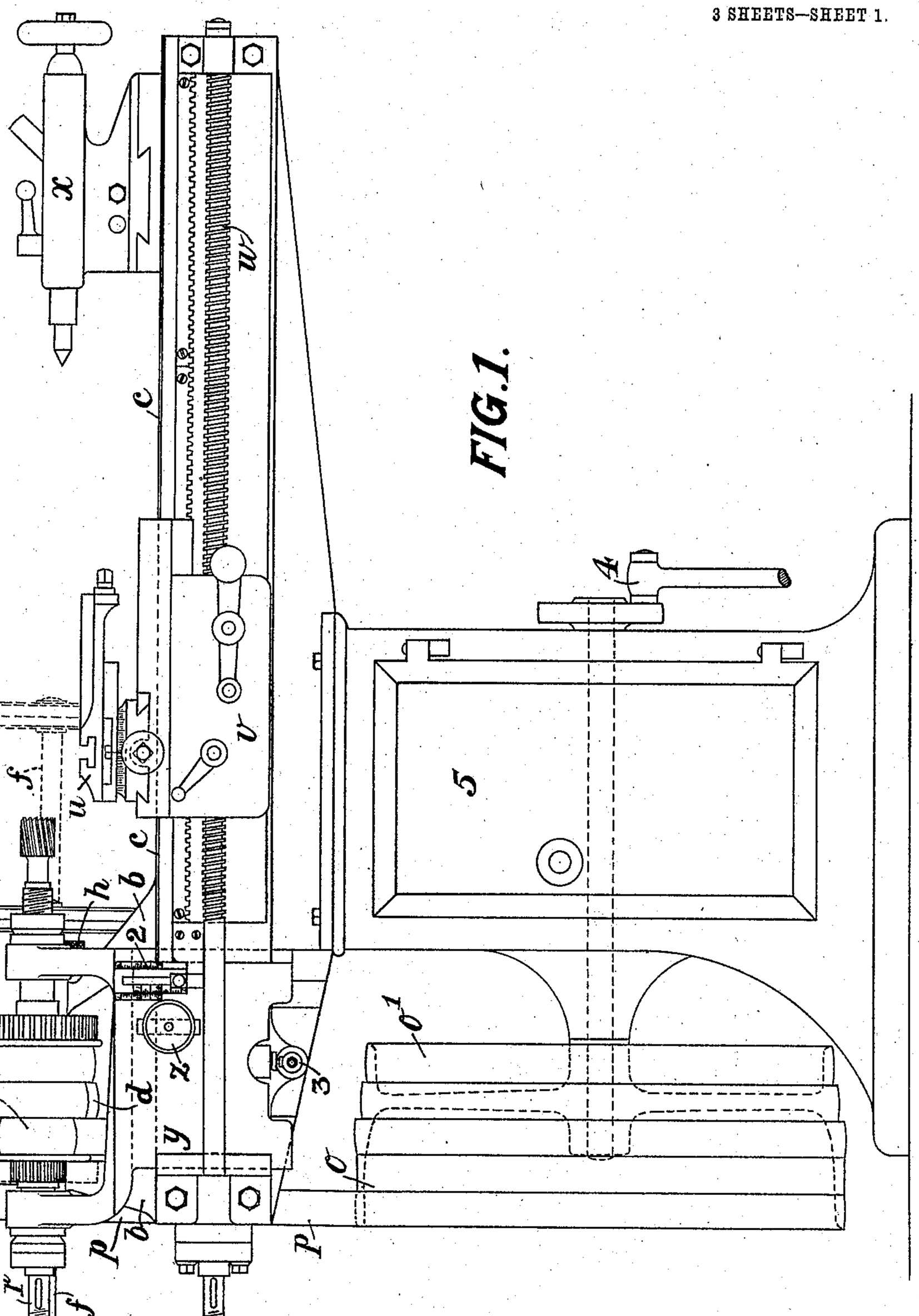
J. J. PEALING & J. D. HARRISON.

LATHE.

APPLICATION FILED SEPT. 3, 1904.

3 SHEETS—SHEET 1.

FIG. 1.



Witnesses

Benjamin & Hall
James F. Duhamel

Inventors

Joseph John Pealing
James Davies Harrison
by Henry Connett
Atty.

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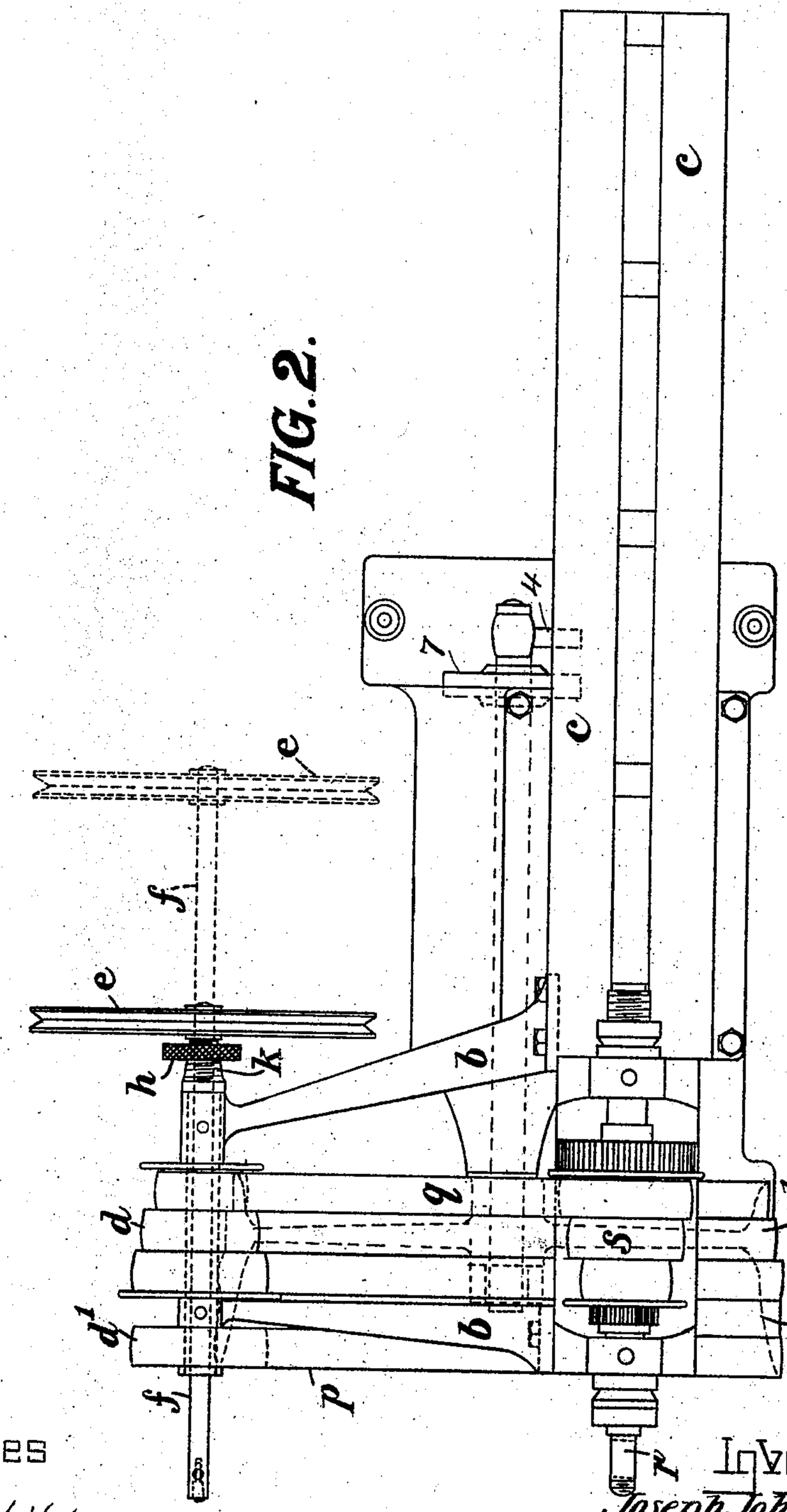
3 SHEETS—SHEET 2.

FIG. 2.



Witnesses

Benjamin H. Hoeft

James F. Duhamel.

Inventors

Joseph John Pealing

James Davies Harrison

by Henry Orrmond
Atty

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3 SHEETS—SHEET 3.

Fig. 3.

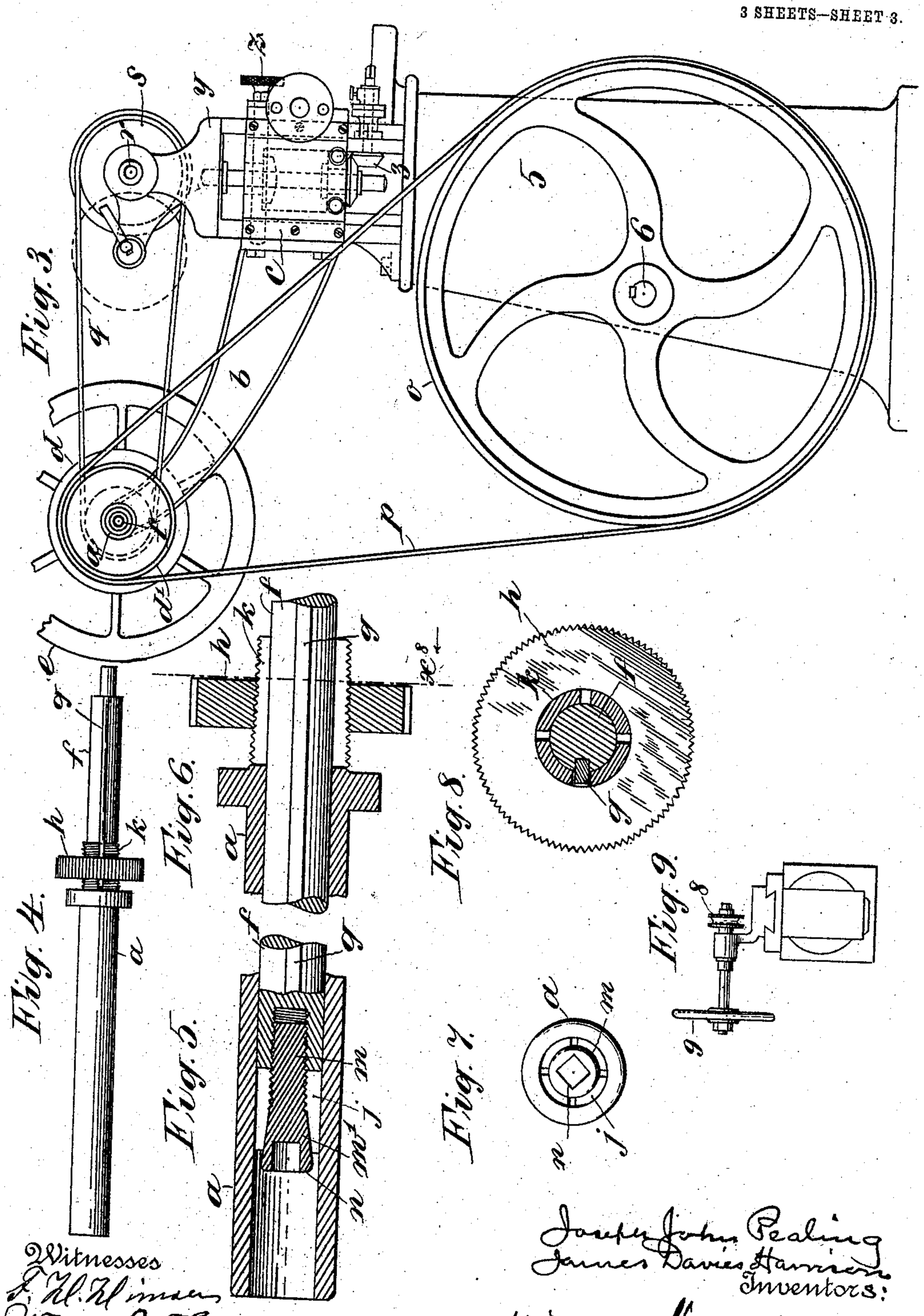

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 8.

Fig. 9.

Fig. 7.

Witnesses
E. H. Klimes
William J. Firth

Joseph John Pealing
James Davies Harrison
Inventors:

By their Attorneys Kenny & Barnett

UNITED STATES PATENT OFFICE.

JOSEPH JOHN PEALING AND JAMES DAVIES HARRISON, OF LIVERPOOL, ENGLAND.

LATHE.

No. 815,733. Specification of Letters Patent. Patented March 20, 1906.

Application filed September 3, 1904. Serial No. 223,278.

To all whom it may concern:

Be it known that we, JOSEPH JOHN PEALING and JAMES DAVIES HARRISON, subjects of the King of Great Britain, residing at Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Lathes, (for which an application for a patent in Great Britain has been filed April 12, 1904, under No. 8,411,) of which the following is a specification.

This invention relates to lathes provided with means for grinding and the like, and has for its object to furnish the lathe with means whereby a grinding device mounted on the lathe may be conveniently driven from a counter-shaft rotatably mounted in brackets or like supports on the lathe-bed.

It has been a common practice to mount a small grinding or like device on a lathe for grinding the work-piece or material in the lathe; but this device has usually been driven from a counter-shaft above and wholly separate from the lathe. According to the present invention a driving mechanism for such a grinding device is provided which is integral with or forms a substantial part of the lathe, said mechanism consisting of a counter-shaft rotatably mounted in bearings carried by the head-stock of the lathe and this counter-shaft carrying a pulley from which the grinding device is driven. The counter-shaft is so constructed that the driving-pulley thereon may be adjusted laterally through wide limits and fixed so as to put it in line for belting with the pulley of the grinding device. Means are also provided according to this invention to enable the grinding device to be driven at a relatively high speed, although driven through the same mechanism which drives the spindle in the head-stock of the lathe.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a front side elevation of a lathe provided with the invention. Fig. 2 is a plan of the same. Fig. 3 is an end elevation as seen from the left in Fig. 1. Various details of the lathe are omitted from this figure, as they are not connected with the present invention. Fig. 4 is a detached side elevation of the extensible counter-shaft drawn to a larger scale than the principal views. Figs. 5 and 6 are enlarged sectional detail views of this shaft, illustrating the clamping devices. Fig. 7 is an end view, and Fig. 8 a cross-section, of the counter-shaft at the line x^8 in Fig. 6. Fig. 9 shows a common form of grinding-tool.

The invention is herein shown as operatively connected with a form of lathe wherein the head-stock is adapted to be raised and lowered; but such a lathe forms no part in itself of the present invention.

The lathe-bed *c* is supported on a pedestal 5 and has mounted in it the head-stock *y*, which is capable of being raised and lowered in a known way by means indicated at 3 and is clamped fast by a screw *z*. A vernier-scale 2 is employed to indicate the extent of elevation. A traveling carriage *v* is moved to and fro by a screw *w* in the lathe-bed, and on this carriage is mounted a holder *u* for the grinding-tool. This device may be an ordinary tool of a well-known kind, as seen in Fig. 9. In the pedestal is mounted the main shaft 6, which may be driven through a crank 7 and treadle-rod 4. On the shaft 6 are secured a main pulley *o* and cone-pulleys *o'*, which may be integral and form also a fly-wheel.

x is a work-piece support for use when the head-stock *y* is in its lowest position.

r is the head-stock spindle, and *s* represents cone-pulleys thereon.

In suitable brackets *b* on the lathe-bed *c* is rotatably mounted a tubular counter-shaft *a*, on which are secured cone-pulleys *d*, one of which is connected by a belt *q* with the cone-pulleys *s* on the lathe-spindle *r*, and a pulley *d'*, which is connected by a belt *p* with the pulley *o*.

Slidable longitudinally in the counter-shaft *a* is a shaft *f*, which is splined so that it must rotate with the counter-shaft, and on this shaft *f* is a pulley *e*, which may be adjusted, through the medium of the slidability of its shaft, to proper alinement with the pulley 8 of the grinding-tool, such as that seen in Fig. 9, for example, wherein 9 is the wheel of the grinding-tool. As this tool will be carried by the carriage *v*, and may thus be moved, through the medium of the screw *w*, to any position within wide limits along the lathe-bed, the construction described permits the pulley *e*, which drives the grinding-tool, to be moved into alinement with the corresponding pulley of said tool, so that the belt over the pulleys may keep its place. In Figs. 1 and 2 the pulley *e* is shown in full lines in the

position it will ordinarily occupy when not in use and dotted lines in one of its operative positions. When the shaft *f* has been properly adjusted to the position desired in the counter-shaft *a*, it is secured in that position by means illustrated in detail in Figs. 5, 6, 7, and 8. The shaft *f* has a spline *g*, which plays in a keyway in the tubular shaft *a*, and the latter has a tapered, screw-threaded, and slitted end portion *k*, on which screws a milled nut *h*, that clamps the shaft *a* firmly on the shaft *f* at that point. At its inner end, or that end which will be inside of the shaft *a* when the pulley *e* is in its working position, the shaft *f* is made hollow or bored out for a suitable distance, and this tubular portion *j* is slitted, so that it may expand, and internally screw-threaded and coned to receive a screw *m*, provided with a coned expanding-head *m'*, which when driven in expands the tubular slitted portion *j* of the shaft *f* in the hollow shaft *a* and binds it fast in the latter. The screw *m* may have in it a recess *n* to receive a suitable key for turning the screw.

Obviously the lathe may be driven by any power desired. For certain operations it is found desirable for the main pulley or fly-wheel on the lathe-shaft 6 to carry two belts, one for driving the counter-shaft *a* and the other for driving the lathe-spindle. Hence the three pulleys *o'* may be employed for driving the lathe-spindle, and the cone-pulleys on the counter-shaft are for use in connection with the cone-pulleys on the lathe-spindle.

The counter-shaft *a* is preferably mounted on a level with the head-stock spindle when this latter is raised to an extent equal to half of its full rise. By this arrangement it has been found in practice that it is possible to raise or lower the head-stock without providing for any special belt-tightening device, as the increase in distance between the counter-shaft *a* and the head-stock spindle *r* when the latter is raised or lowered from its midway position to its highest or lowest position is not sufficient to appreciably affect the power-transmitting properties of the belt, as this latter is capable of stretching the small amount necessary. A concurrent advantage which accrues from the above arrangement and which is of importance is that the head-stock spindle can be driven at a lower speed relative to the fly-wheel or pulley *o* than is usual, owing to the head-stock spindle being speeded down through the pulley *d*. This is a considerable advantage when driving a lathe by foot, as sometimes when it is required to move the work-piece at a slow speed it is exceedingly difficult to keep the fly-wheel in rotation at the slow speed required. Although by means of this device the head-stock spindle is slowed, the counter-shaft is driven at a high speed, as is always found preferable for driving grinding and like devices.

The usual idlers and tension-rollers may be employed with the belts; but these are common and form no part of the present invention.

Although the invention has been described as operating in connection with a somewhat special but known form of lathe, it will be obvious that its application is not restricted to this form of lathe, which has a rising-and-falling head-stock.

Herein for convenience of description the tubular shaft *a* has been called the "counter-shaft" and the pulley-shaft *f* referred to as "slidable" therein; but practically the two constitute a telescopic counter-shaft, of which *f* is the extensible member, carrying the driving-pulley *e*.

Having thus described our invention, we claim—

In means for the purpose specified, the combination with the lathe-bed, a traveling carriage thereon, means for moving said carriage axially of the bed, and brackets on the bed, of a telescopic counter-shaft rotatable in said brackets and having its axis parallel with the axis of the lathe-bed; a driving-pulley on the elongating member of the counter-shaft and capable of being set opposite to the carriage on the bed, and means for securing together the members of the counter-shaft when the adjustment has been effected.

In witness whereof we have hereunto signed our names, this 23d day of August, 1904, in the presence of two subscribing witnesses.

JOSEPH JOHN PEALING.
JAMES DAVIES HARRISON.

Witnesses:
HUBERT PUMPHREY,
J. MCLACHLAN.