

(No. Model.)

4 Sheets—Sheet 1.

W. L. COOP.
LATHE.

No. 362,721.

Patented May 10, 1887.

Fig. 2.

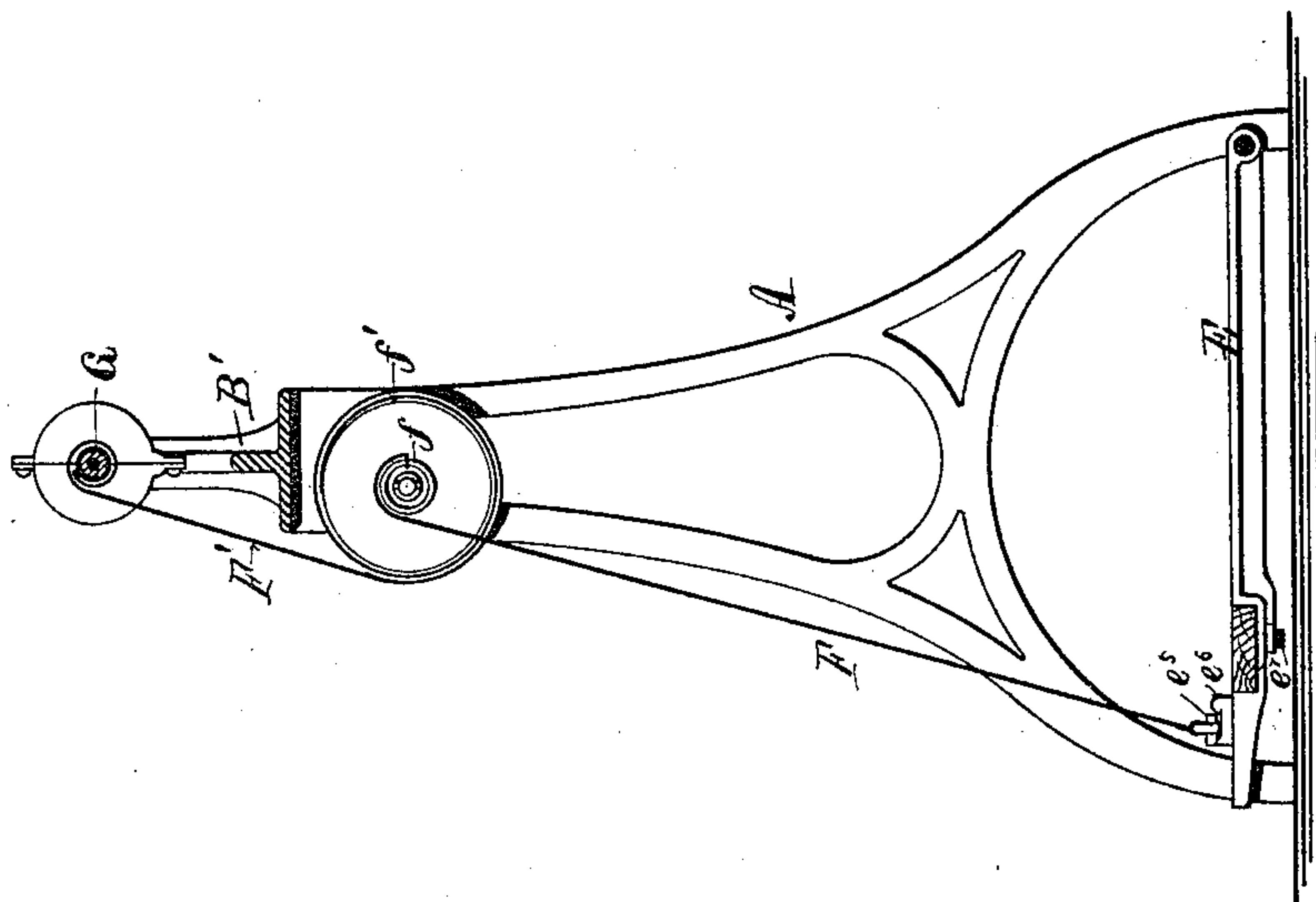
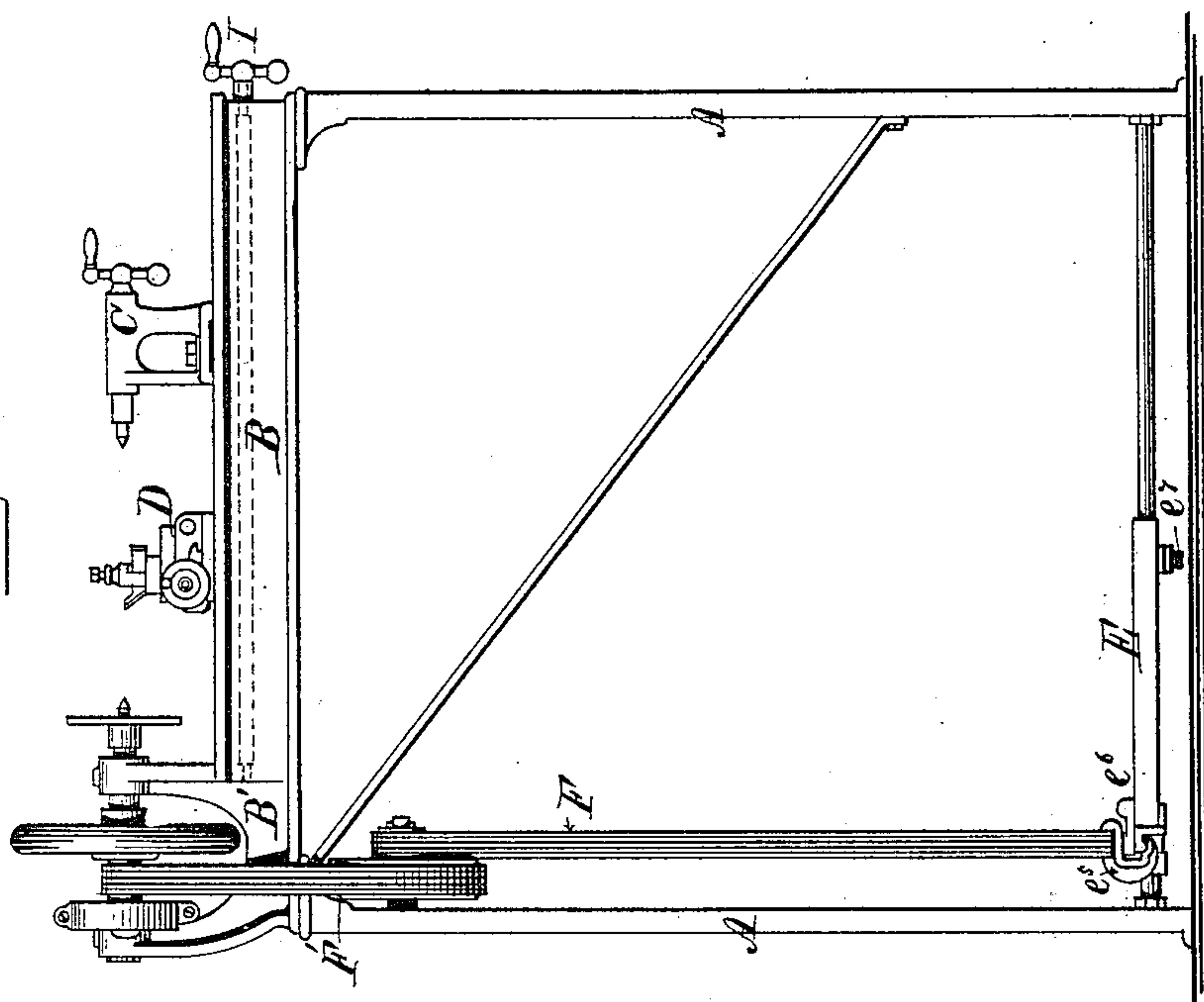


Fig. 1.



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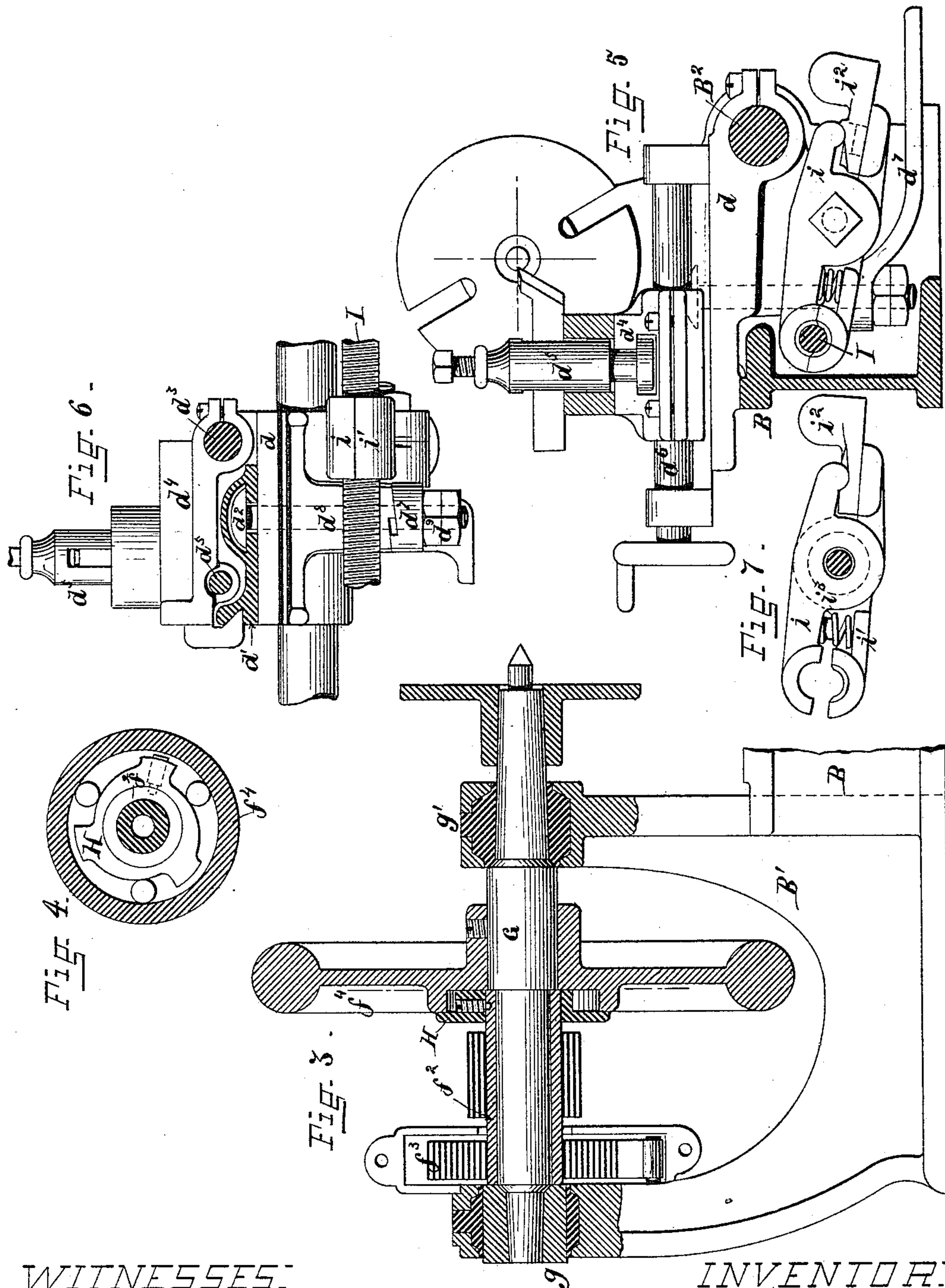
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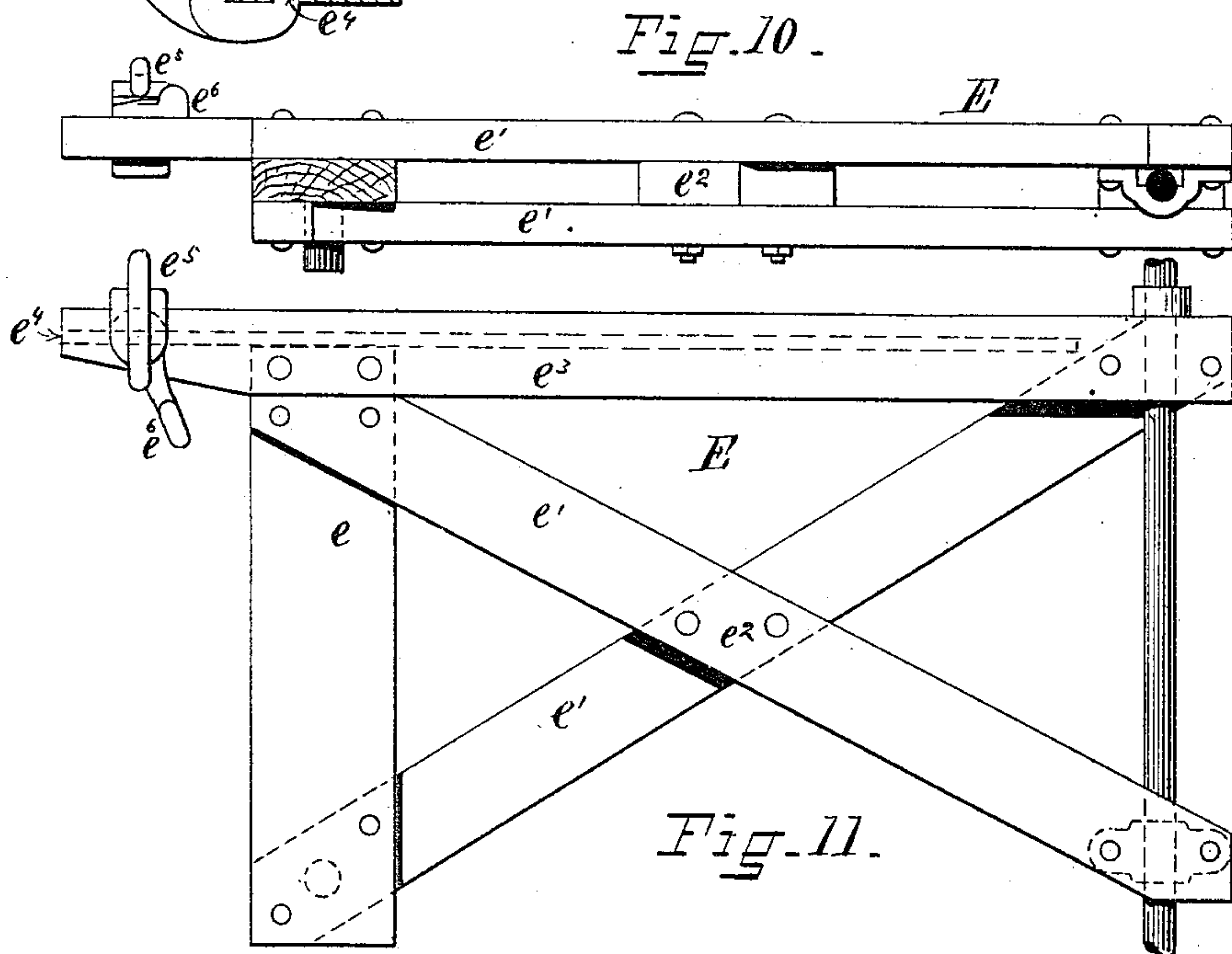
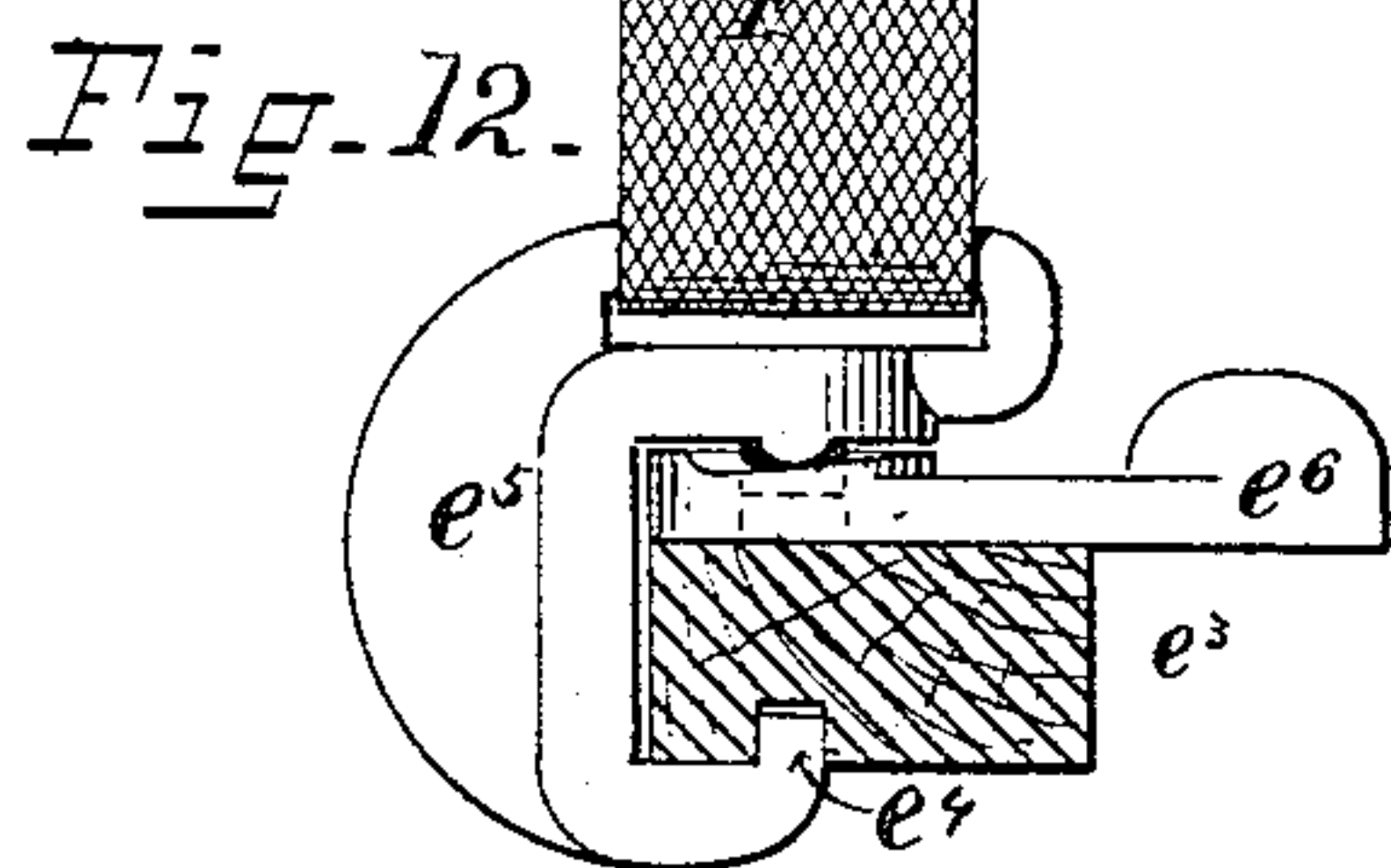
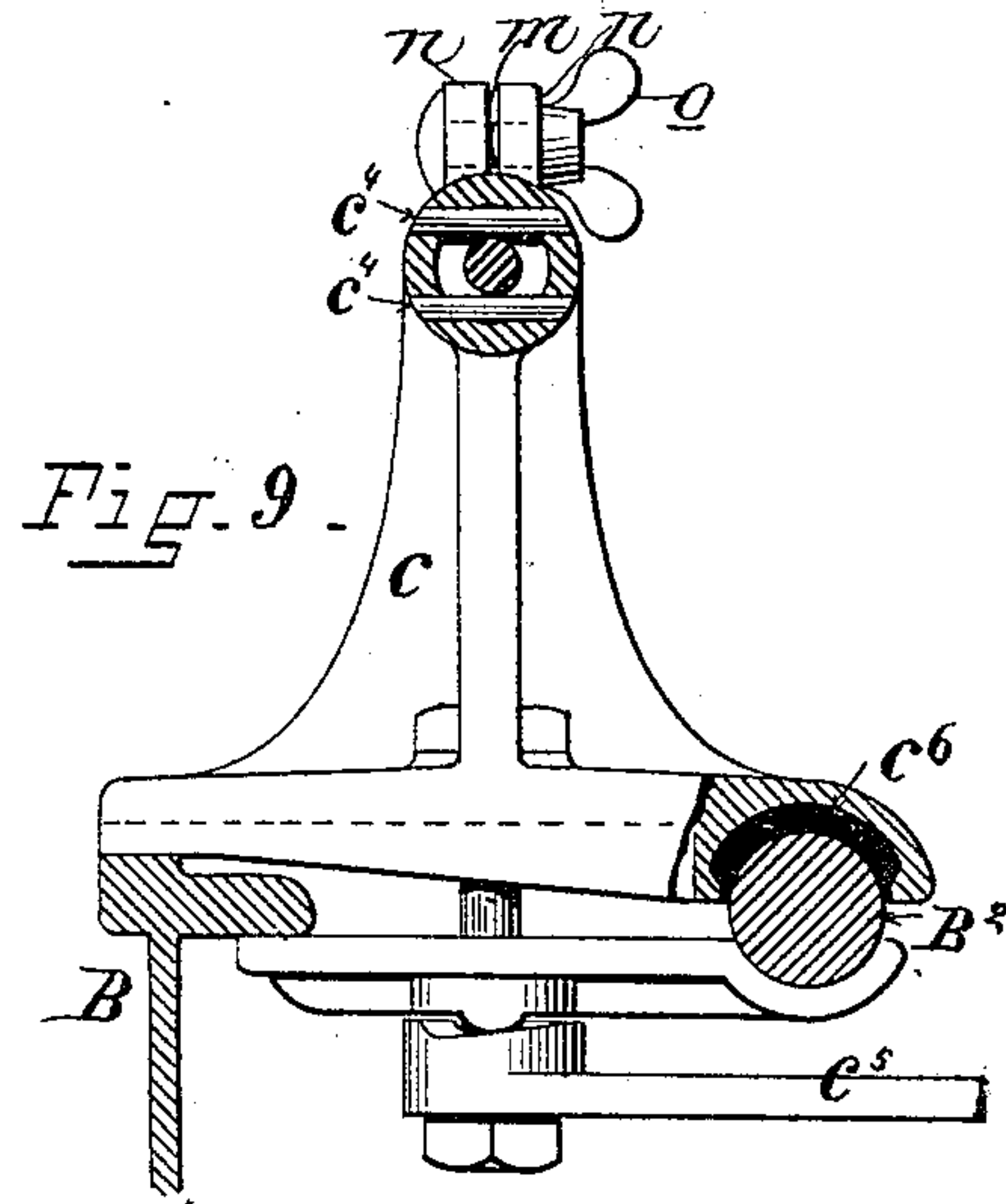
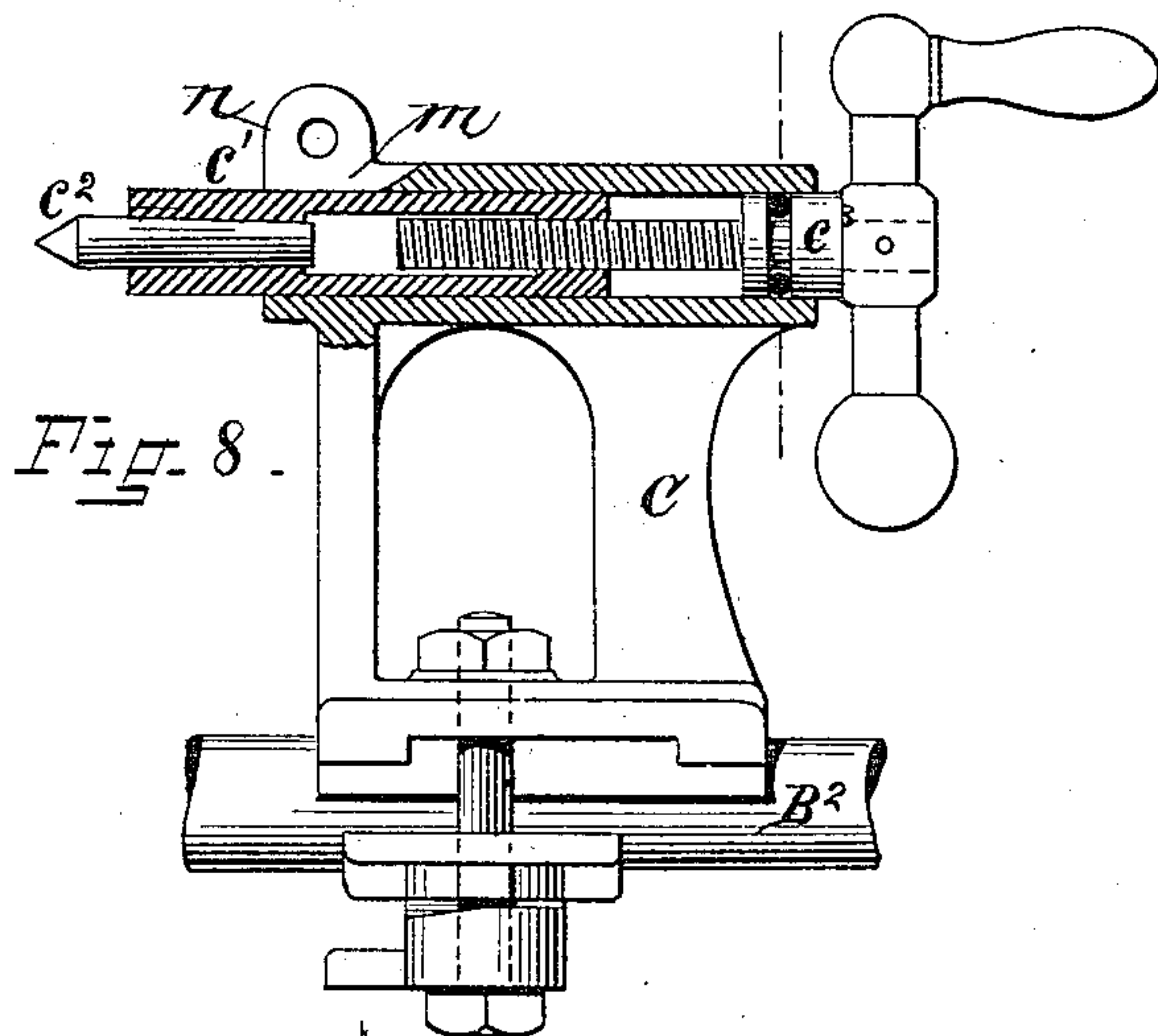
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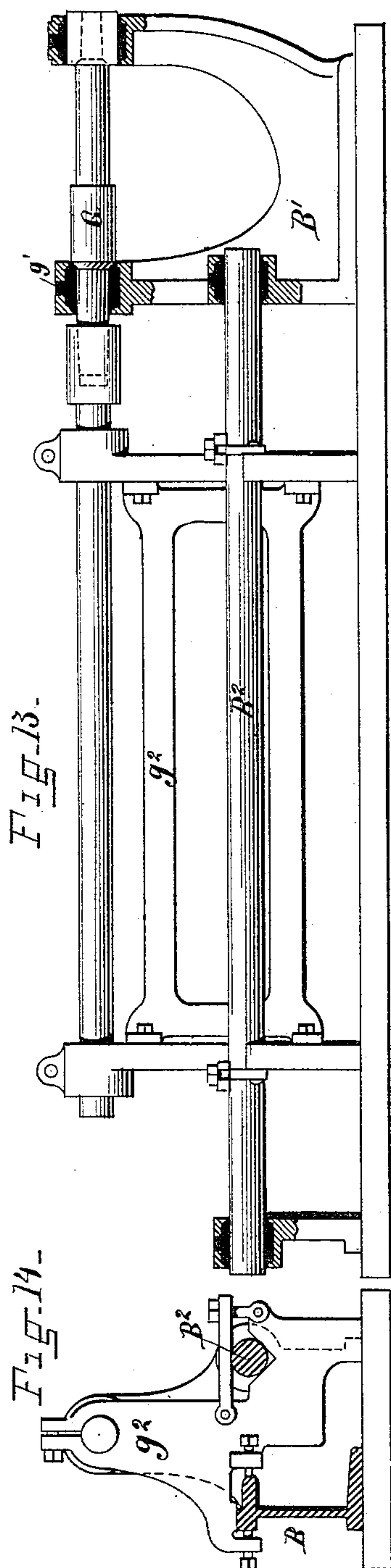
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4 Sheets—Sheet 4.

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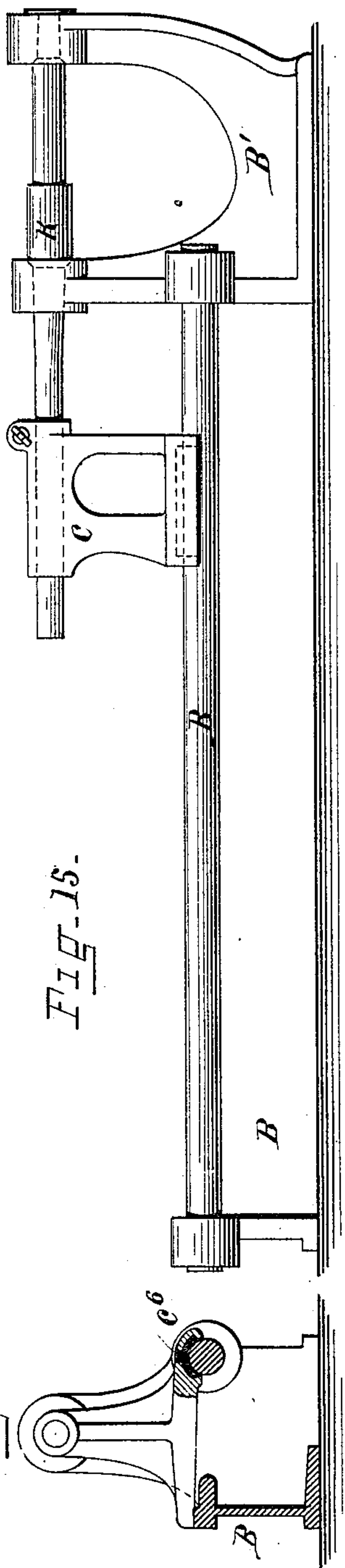
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UNITED STATES PATENT OFFICE.

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LATHE.

SPECIFICATION forming part of Letters Patent No. 362,721, dated May 10, 1887.

Application filed October 9, 1882. Serial No. 73,784. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. COOP, of the city and county of Providence, and State of Rhode Island, have invented a new and useful Improvement in Foot-Lathes; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

Foot-lathes for light work and use of amateur mechanics have heretofore been constructed in the same manner as power-lathes, and were therefore cumbersome and costly. The various changes to adapt them for different articles to be turned required considerable time and labor, and their use considerable power, or they were constructed cheaply, on the principle of the common wood-turning lathe, and were not practical for turning out good and accurate work.

The object of this invention is to so construct a foot-lathe that the best quality of work can be done on the same, that the slide-rest and tail-stock can be quickly adjusted to the various kinds of work, and the whole furnished at a price within the reach of amateurs.

The invention has reference to the improved construction of the parts of a foot-lathe, on which the accuracy of the work and the ready adaptation of the lathe to the various kinds of work depends; and it consists in the peculiar and novel construction of the head-stock, the manner of securing and adjusting the spindle, the peculiar and novel construction of the slide-rest and tail-stock, by which the same may be readily moved from place to place and quickly secured to firmly resist all the strain on the cutter, and other improvements, more fully set forth hereinafter.

Figure 1 is a front view of my improved foot-lathe, showing the relative positions of the various parts. Fig. 2 is a vertical sectional view of the lathe on a line through the head-stock, showing the foot-treadle and the strap-connection with the spindle. Fig. 3 is a longitudinal section of the head-stock with the connected bed-rail broken away and showing the construction of the bearings of the spindle and the spring connected with the sleeve, which is connected with the fly-wheel by means of the cam-clutch, shown in Fig. 4 in cross-section. Fig. 5 is a side view of the slide-rest, showing the

manner of connecting the same to the feed-screw rod, the bed-rail and guide-bar being shown in section. Fig. 6 is a front view of the slide-rest, partly in section, together with portions of the guide-bar and feed-rod. Fig. 7 is a view of the screw-clamp, showing the cam for operating the same. Fig. 8 is a side view, partly in section, of the tail-stock, the guide-bar being shown in portion. Fig. 9 is an end view, partly in section, of the tail-stock, showing the cam device for securing the same, the bed-rail and guide-bar being shown in cross-section. Fig. 10 is a side view of the treadle with the adjustable strap-clamp mounted thereon. Fig. 11 is a plan view of the treadle, showing the cross-braced support of the foot-board and the side bar secured to the treadle, with the clamp groove or way of said bar, shown in broken lines, and the strap-clamp working on said side bar. Fig. 12 is a view of the clamp by means of which the strap is connected with the treadle, the side bar having the clamp-groove therein being shown in cross-section. Fig. 13 is a side view of a jig or frame in which the rear bar and the spindle are temporarily supported in their true axial position and secured by casting Babbitt metal or other suitable composition around the same while being adjusted and secured in position. Fig. 14 is an end view of the adjusting jig or frame. Fig. 15 is a view of the head-stock and lathe-bed, showing a mandrel inserted temporarily into the head-stock and into the tail-stock, so as to place the centers on a true line and fit the tail-stock by casting Babbitt or other metal into the bearing. Fig. 16 is an end view of the tail-stock, shown partly in section, and a sectional view of the lathe-bed.

In the drawings, A A are the two standards on which the lathe-bed is secured. This lathe-bed consists of the bed-rail B, of nearly L-shaped section, cast in one piece with the head-stock B'. It further consists in the round guide-bar B², made preferably of cold-rolled bar-iron or steel. This bar is secured permanently at each end and forms the rear bearing of the tail-stock and the bed of the slide-rest, as also the guide on which the same may be moved from one point to the other, and secured so as to be always in the true axial line of the spindle.

C is the tail-stock, and D the slide-rest, both

of which are mounted and are adapted to slide back and forth on the lathe-bed B B².

Power is applied to the lathe through the foot-treadle E. (Shown enlarged in Figs. 10 and 11.) This treadle differs in its construction from the ordinary rectangular construction in that the treadle-board *e* is supported by two diagonal braces, *e'* *e'*, crossing each other at *e*², and there firmly secured together, with a distance-block placed between the two braces *e'* *e'*. By this construction a rigid treadle is secured. The treadle-board, being firmly braced, is not liable to spring or yield when the pressure is exerted at either end of the same. On one side of the treadle the side bar, *e*³, is secured, the under side of which is provided with the clamp way or groove *e*⁴. (Indicated in Fig. 11 in broken lines.) To this bar *e*³ the drive-strap F may be secured at any desired place, so that the speed and power may be regulated, for the farther from the pivotal point of the treadle the strap is secured the greater will be the distance through which the end of the strap will pass at each oscillation of the treadle and the greater the speed, while the nearer the strap is brought to the pivotal point of the treadle the shorter will be the reciprocation and the greater the leverage exerted. The strap is secured in the loop of the strap clamp-piece *e*⁵, which clamp-piece is provided with a hook-like projection, which enters the groove *e*⁴ in the bar *e*³ and allows the clamp-piece to slide in and out on the bar. To secure the same at any desired place, the cam-lever *e*⁶ is secured by a pin to the clamping-face of the clamp-piece *e*⁵. This cam-lever is provided with two spiral cam-surfaces, which bear against slightly-raised projections on the clamp-face of the clamp-piece *e*⁵, so that a partial rotation exerts considerable pressure and secures the clamp-piece *e*⁵ firmly to the bar *e*³ in any desired position, and allows the place at which the strap F is connected with the treadle E to be quickly changed, as is clearly shown in Fig. 12. To prevent the jar and noise of the treadle striking the floor, one or more elastic buttons, *e*⁷, are placed on the under side of the treadle, as is shown in Fig. 10.

The strap F is secured to and winds on the small pulley *f*, which forms part of and turns with the large pulley *f'*, journaled on a stud projecting from the standard A, below the lathe-bed. The strap F' is secured to and winds on the larger pulley, *f'*, the other end being secured to and winds on the sleeve *f*², surrounding the spindle G. This sleeve *f*² is loose on the spindle, and is provided at one end with the helical spring *f*³, one end of which is secured to the sleeve *f*², and the other end to the head-stock. On the other end of the sleeve the cam-clutch H (shown in Fig. 4) is secured, as shown, by a set-screw, the rollers *h* of the cam-clutch H engaging with the inner side of a rim, *k*, formed on the balance-wheel *f*⁴, which is secured to and revolves with the spindle G. The lathe-spindle G is therefore turned in the manner of the old jig-mo-

tion—that is to say, the spring *f*³ turns the sleeve *f*² by its tension, and winds the strap F' on the same, thereby unwinding the same strap from the large pulley *f'* and winding the strap F on the small pulley *f*, so that in the normal condition the treadle is raised. When now the treadle is depressed, the pulleys *f* and *f'* are turned in the opposite direction, the strap F' turns the sleeve *f*², the clutch H engages with the balance-wheel and turns the spindle, thereby also winding the helical spring *f*³ on the sleeve *f*², and when the downward motion of the treadle is completed the helical spring will again turn the sleeve, the clutch will release the balance-wheel, and the spindle will continue to revolve, carried by the momentum of the balance-wheel.

The spindle is supported in bearings in the head-stock B'. To secure the accurate adjustment of the spindle with reference to the bed of the lathe, the step-bearing block *g*, of hard metal, is fitted to the spindle, and is secured by casting Babbitt or other composition metal around the same, while the bolster or forward bearing of the spindle is made of Babbitt or similar metal cast around the spindle, the spindle being securely held for the time being by the jig *g*², (shown in Figs. 13 and 14,) at the same time that the rear bar, B², is also held temporarily by the jig, and the Babbitt or other composition metal is cast around the step-bearing block *g*, the bolster-bearings *g'*, and into the two end bearings of the bar B², thus securing the spindle and the bar B², which forms the guide for the slide-rest and tail-stock, accurately with their axial lines parallel to each other. It is observed that the adjusting-jig *g*² is only used temporarily for adjusting the said parts with their axes parallel, in order to true the machine, and that after the Babbitt or soft metal is cast in the bearings the jig is removed. This slide-rest differs from all others slide-rests heretofore constructed, primarily, in that it is guided and held by the bar B², while the carriage rests on the front bed-rail, which takes up all the strain caused by the resistance to the cutter, and thereby holds the slide-rest firmly on the bed-rail B, when in operation, without straining the bar B².

The tool-carriage *d*, as is shown in Fig. 5, rests on the bed-rail B, the guide-bar B² passing through the rear portion of the same. This rear portion is split, so as to allow for a limited adjustment for wear. To the carriage *d* the slide-bed *d'* is secured by the central bolt, *d*², the head of which works in a transverse slot, *d*¹⁰, formed in the bed *d'*, and by virtue of this construction a combined swivel and sliding joint is formed between the tool-carriage and the slide-bed, so that the bed may be rotated, and also may be slid on said carriage in an obvious manner. The front of the bed is provided with a V-shaped groove and the rear with the fixed bar *d*³, and the slide *d*⁴ is secured by inclosing the bar *d*³, which forms the guide on which the slide *d*⁴ moves, and resting on the

front of the bed d' , preferably in the V-shaped groove. The tool-post d^3 is secured to the slide in the usual manner. The slide is operated by the fixed worm-screw d^6 , turning in a nut 5 in the slide in the usual manner. To quickly connect and disconnect the bed d' , and allow the same to be freely adjusted on the carriage, the bolt d^2 is provided with the cam-lever d^7 , interposed between the end of the sleeve d^8 , 10 extending down from the carriage and surrounding the bolt d^2 , and the nut d^9 , so that a partial rotation of the cam d^7 by the lever will clamp the bed d' to the carriage d , or release the same.

15 To secure the tool-carriage d , and with the same the whole slide-rest D , to the feed-screw I , operated at the tail end of the lathe by the crank I' , the peculiar clamp shown in Fig. 7 is used. The same consists of two levers, i and 20 i' , pivotally connected with the carriage of the slide-rest D , the two ends of which are constructed with screw-threads to grasp the feed-screw I , the two opposite ends having the cam i^2 placed between them, constructed so that a 25 partial rotation of the cam i^2 will separate the ends and close the opposite ends around the feed-screw I , thereby connecting the slide-rest with the feed-screw. The coiled spring i^3 is placed between the levers, so that the same 30 will open and release the screw I when the cam i^2 is turned in the opposite direction.

The tail-stock C , like the slide-rest, rests on the bed-rail B and the bar B^2 , and is secured by means of the clamp-lever c^5 , provided with 35 a boss on which two inclined planes are formed, which bears against projections on the clamping-plate c^7 , which is connected to the body of stock C by means of bolts, and takes up against the under faces of the guide-bar and the bed- 40 rail, so that by a partial revolution of the cam the clamp-plate may firmly secure the tail-stock to the lathe-bed, as is clearly shown in Figs. 8 and 9.

The dead-spindle is formed by securing in 45 the threaded sleeve c' the center c^2 , and operating the same by means of the feed-screw bar c^3 , which is held against longitudinal displacement by the pins c^4 c^4 passing through a groove made in the end of the screw c^3 , so that by 50 turning the crank on the screw c^3 the center can be moved longitudinally along its axis.

As shown in Figs. 8 and 9, the tail-stock C is formed with a vertical slit, m , upon the top and near one end of said stock. The slit m 55 extends from the outside of the top of the tail-stock into the socket in which the sleeve c' slides, and from each side of the slit m and to the outside of the stock extends an ear, n , each provided with a transverse screw-threaded 60 eye, which eyes lie in opposite alignment, and the screw-threaded bolt of the thumb-screw o passes through the eyes of the ears n . By virtue of this construction the thumb-screw o may be turned the one way or the other, in order 65 to move the ears n toward or away from each other, and so to bind or release the sliding

sleeve c' in the socket of the tail-stock, as desired.

To adjust the axial center c^2 of the tail-stock on a line with the axial center of the spindle 70 G and the guide-bar B^2 , the mandrel K is placed in the head-stock B' , and the tail-stock is secured on the mandrel, as is shown in Fig. 15, and fluid Babbitt or other composition 75 metal is poured into a cavity formed at c^6 in the tail-stock, so as to form a bearing on the bar B^2 , as is shown in Figs. 9 and 16. By this arrangement the whole lathe is lined up accurately, and all parts are secured in their 80 proper place by the soft cast metal without the great expense formerly incurred in fitting all these parts to a true line, thus securing accuracy at the least possible expense.

This lathe is adapted for all kinds of light work, which can be produced with as much 85 nicety as work performed on the costly machines heretofore in use, while the cost of the lathe is materially reduced.

Having thus described my invention, I claim as new and desire to secure by Letters Patent— 90

1. The combination, with a guide-bar and a bed-rail, of a tool-carriage sliding on said bar and rail, a slide-bed adapted to slide and turn on said carriage, and a slide mounted and sliding on said bed and provided with a tool-post, 95 substantially as described.

2. The combination, with a fixed guide-bar and bed-rail, of a tool-carriage journaled and traveling on said bar and adapted to rest and slide on said rail and provided with means, 100 substantially as described, for sliding said carriage to and fro, a slide-bed having a combined swivel and sliding joint connecting it with said carriage, substantially as described, and provided with means for holding and re- 105 leasing the bed, a slide mounted on said bed and sliding thereon and provided with means for sliding the same, and a tool-post disposed upon said slide over the shear of the lathe, substantially as described, whereby the working- 110 stress on the tool-post may be received in the main by the subjacent bed-rail, as herein set forth.

3. The combination of a fixed guide-rod and a rigid bed-rail parallel therewith, a feed- 115 screw, and the slide-rest, constructed substantially as described, and provided with a pair of pivoted levers having an interposed cam-lever at one end thereof, the other ends of said 120 levers engaging the feed-screw, substantially as described, whereby the turning of the feed-screw may move the slide-rest back and forth.

4. The combination of the head-stock and bed-rail formed together, a spindle mounted in said head-stock and means for driving the 125 same, a guide-bar set parallel to said rail, and a slide-rest working on said bar and rail, substantially as described.

5. The combination, with the tail-stock provided with a socket and formed with a 130 slit opening into the socket, said slit having ears fixed to each side thereof, and a thumb-

screw engaging both of said ears for relatively moving the ears, as described, of a tubular sleeve sliding in the socket and provided at one end with an internal screw-thread and at the other end with a conical or tapering bore, a spindle-center mounted in said bore, and a feed-screw bar fixed against longitudinal movement and placed within said socket and working in the internal screw-thread of said sleeve, substantially as described, whereby the turning of the screw-bar may feed the spindle-center in and out, as set forth.

6. The combination, with the foot-treadle, of a side bar mounted thereon and provided with a clamp groove or way, and a strap-clamp adapted to rest on said side bar and to work in the groove thereon, substantially as described, whereby the strap-clamp may be adjusted along the side bar to vary the speed of the lathe, as set forth.

7. The combination, with the head-stock provided with spindle-bearings, of the spindle mounted loosely in said bearings, as described, a loose sleeve surrounding a part of said spindle, a coil-spring connected with said sleeve and said head-stock, a fly-wheel keyed on the spindle, a cam-clutch secured upon said sleeve and engaging the fly-wheel, and a driving-strap connected to and winding on said spindle, all substantially as and for the purpose herein described.

8. The combination of the lathe-frame, the tail-stock and slide-rest sliding on the bed of said frame, the head-stock, substantially as described, mounted on said frame, a loose pulley provided with a small pulley, the foot-treadle, as described, hinged on said frame, a drive-strap connected with the spindle of the head-stock and with the rim of said pulley, and another drive-strap connected with the small pulley and connected adjustably with said foot-treadle, all constructed and operated substantially as and for the purpose herein described.

9. The combination, with the lathe-bed, consisting of the bed-rail B^2 and the guide-bar B , of the slide-rest D , constructed substantially as described and sliding on said bed, the feed-screw-rod I , and the levers i i' , provided with the cam-levers i^2 , said levers intermediate of the slide-rest and the feed-screw, substantially as set forth.

10. The slide-rest D , comprising the combination of the tool-carriage d , adapted to travel on the lathe bed B B^2 , the slide-bed d' , provided with the slot d^{10} , and having the bolt d^2 , connecting the bed with the carriage, the guide-rod d^3 , fixed on said bed, the slide d^4 , sliding on said guide rod and bed, the feed-screw

d^6 for said slide, and the tool-post mounted on the slide, substantially as herein described.

11. The combination of the fixed guide-bar B^2 , the bed-rail B , and the head-stock B' , formed together, and the said stock provided with a spindle, and the tail-stock C sliding on the said bar and rail, substantially as described.

12. The combination of the guide-bar B^2 , fixed in the lathe-frame and provided with the Babbitt or soft-metal castings, the bed-rail B , placed parallel with said bar and provided with the head-stock B' , the spindle G , mounted in said head-stock and provided with the step-bearing g and the Babbitt castings, and the tail-stock C , sliding on said bar and rail and provided with a Babbitt casting, substantially as and for the purpose herein described.

13. The combination, with the tail-stock C , having a socket formed therein, said socket provided with the slit m , the ears n , fixed at each side of the slit, and the thumb-screw o , engaging both ears, of the sleeve c' , working in said socket and provided at the inner end with an internal screw-thread and at the other end with a conical-bore, the spindle-center c^2 , set in said bore, and the feed-screw bar c^3 , projecting in said socket and working in the internal screw-thread of sleeve c' , and provided with the pins c^4 , for holding said bar against longitudinal movement, substantially as herein described.

14. The combination, with the tail-stock C and the guide-bar B^2 and bed-rail B , of the clamp-plate c^7 , having bolts, connecting it with said stock, the clamp-plate engaging the under faces of the bar and rail and provided with the cam-lever c^5 , for clamping and unclamping said plate, substantially as and for the purpose herein described.

15. The head-stock comprising the stock B' , provided with the single bearings, the spindle G , mounted in said bearings, the loose sleeve surrounding said spindle, the spring f^3 , connected with said sleeve and stock B' , the fly-wheel f^4 , and the clutch H , fixed to said sleeve and engaging said fly-wheel, substantially as described.

16. The combination of the frame A , the superposed lathe-bed B B^2 , the sliding tail-stock C and the slide-rest D , the head-stock B' , as described, the pulleys f and f' , the foot-treadle E and the drive-straps F and F' , and the strap-clamp e^2 , all constructed and operated substantially as described.

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