(No Model.) 4 Sheets—Sheet 1.

S. DU PEROW

GRINDING AND FACING OR POLISHING MACHINE.

No. 541,661. Patented June 25, 1895.

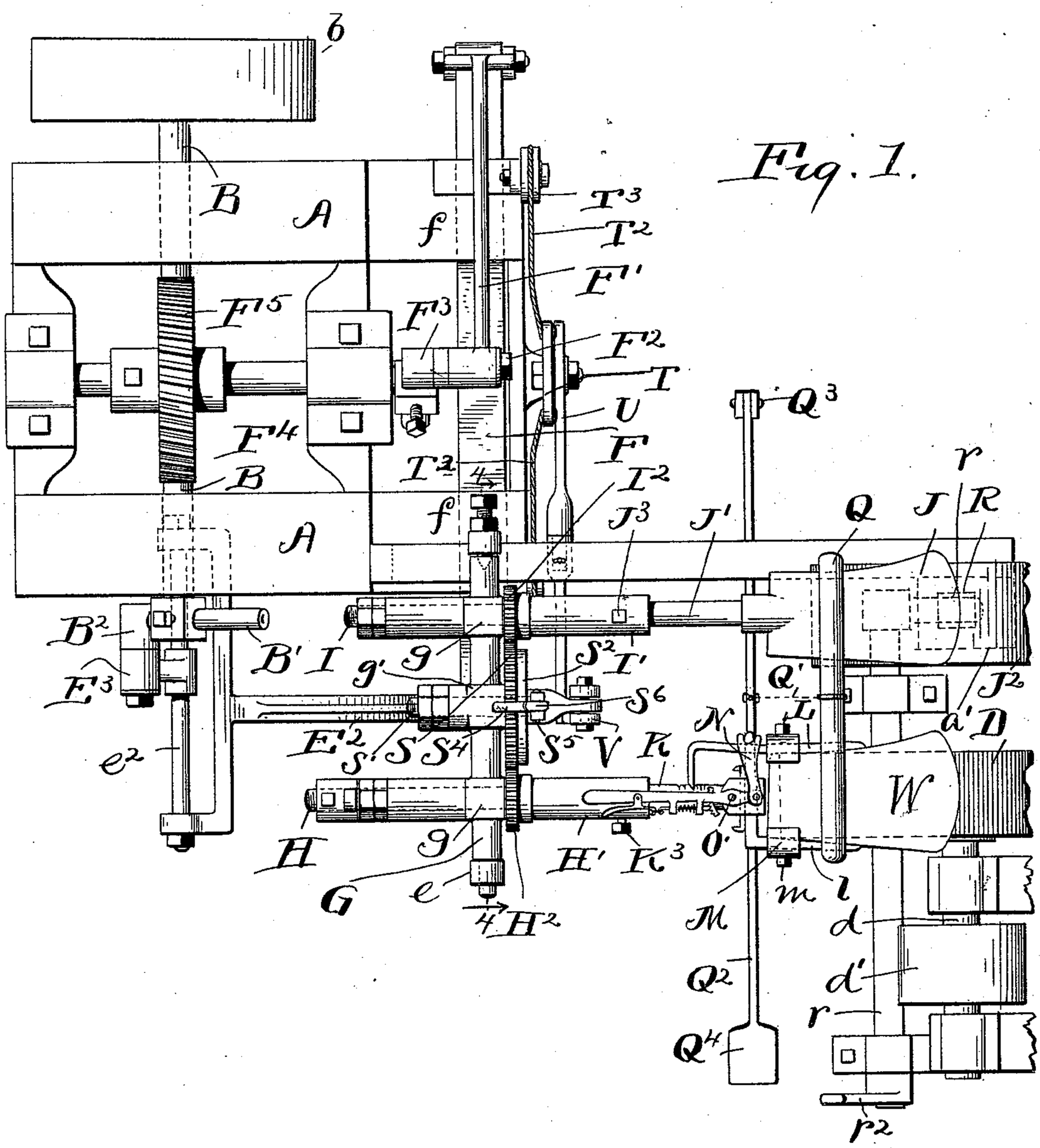

Fig. 1.

Witnesses.
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his attorneys.

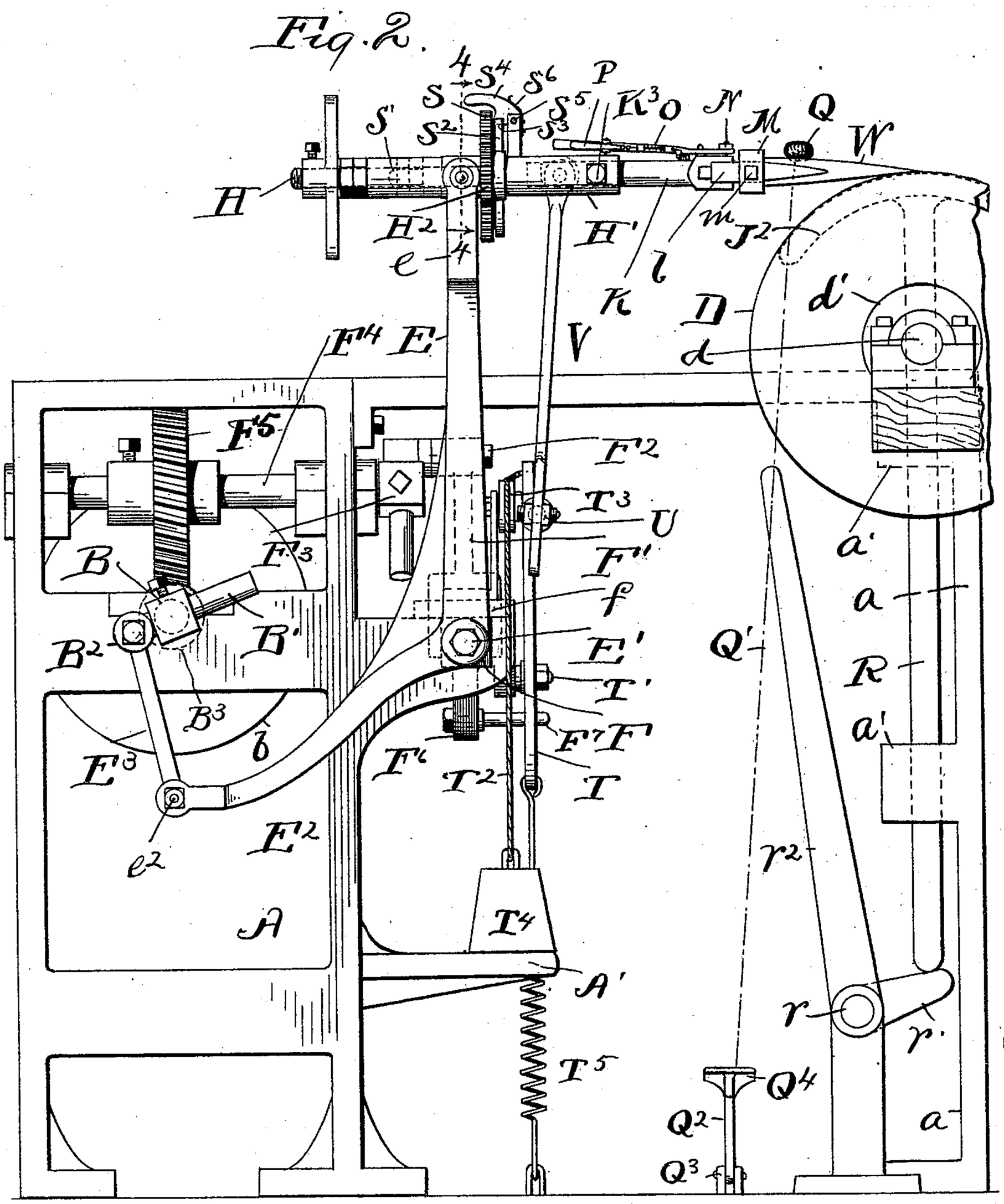
(No Model.) 4 Sheets—Sheet 2.

S. DU PEROW

GRINDING AND FACING OR POLISHING MACHINE.

No. 541,661. Patented June 25, 1895.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

S. DU PEROW

GRINDING AND FACING OR POLISHING MACHINE.

No. 541,661. Patented June 25, 1895.

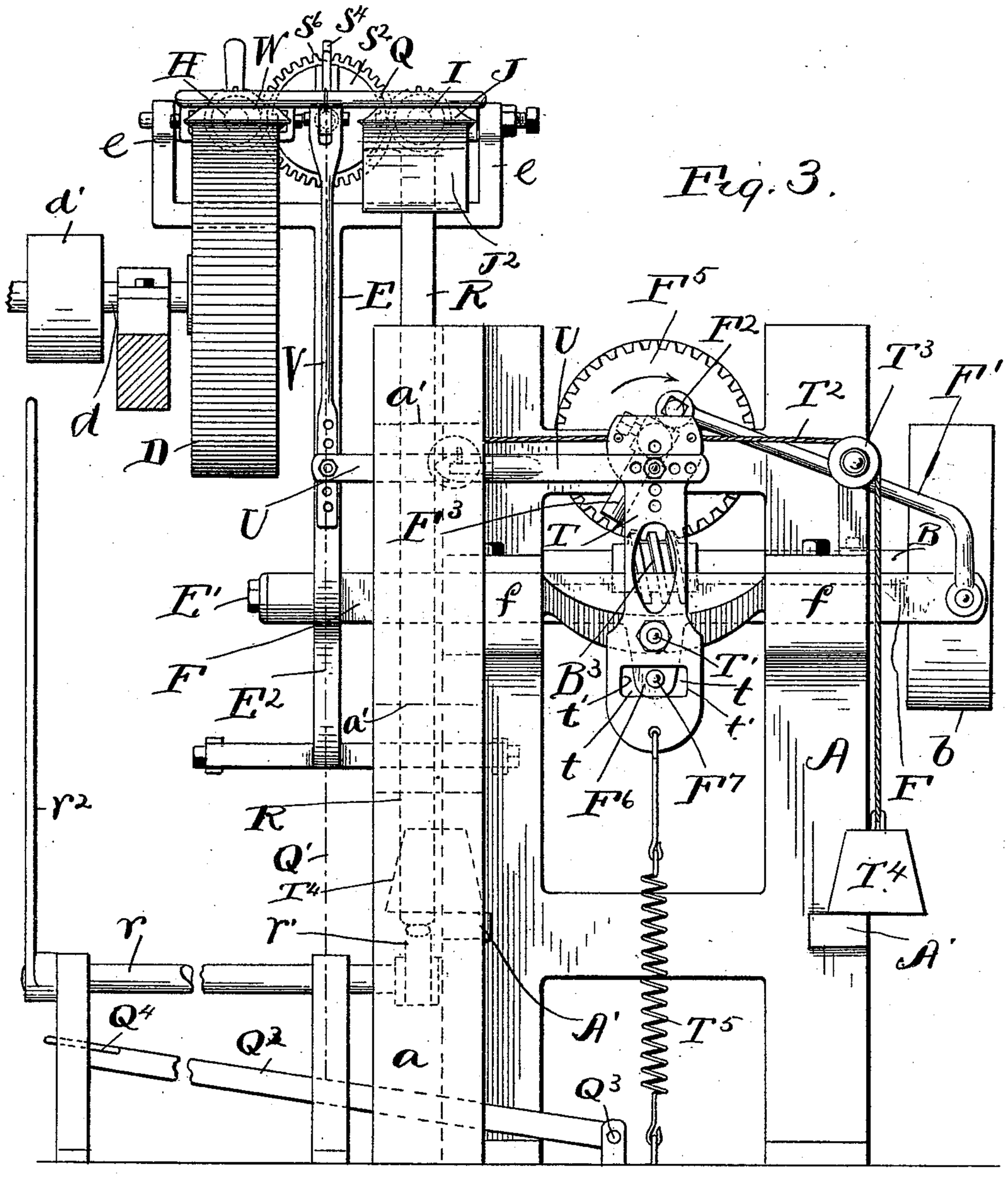

Fig. 3.

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(No Model.) 4 Sheets—Sheet 4.

S. DU PEROW

GRINDING AND FACING OR POLISHING MACHINE.

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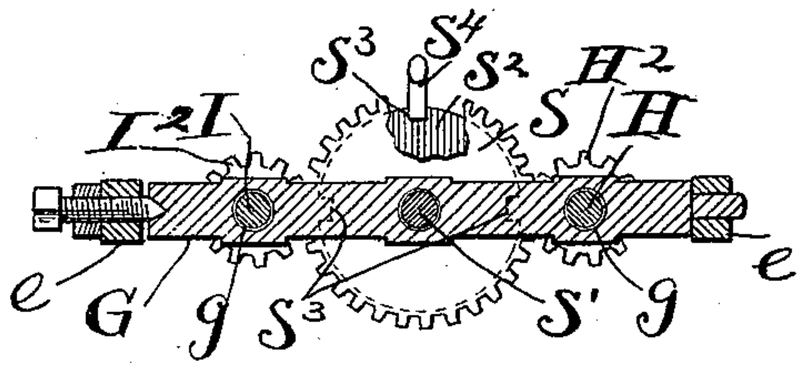

Fig. 4.

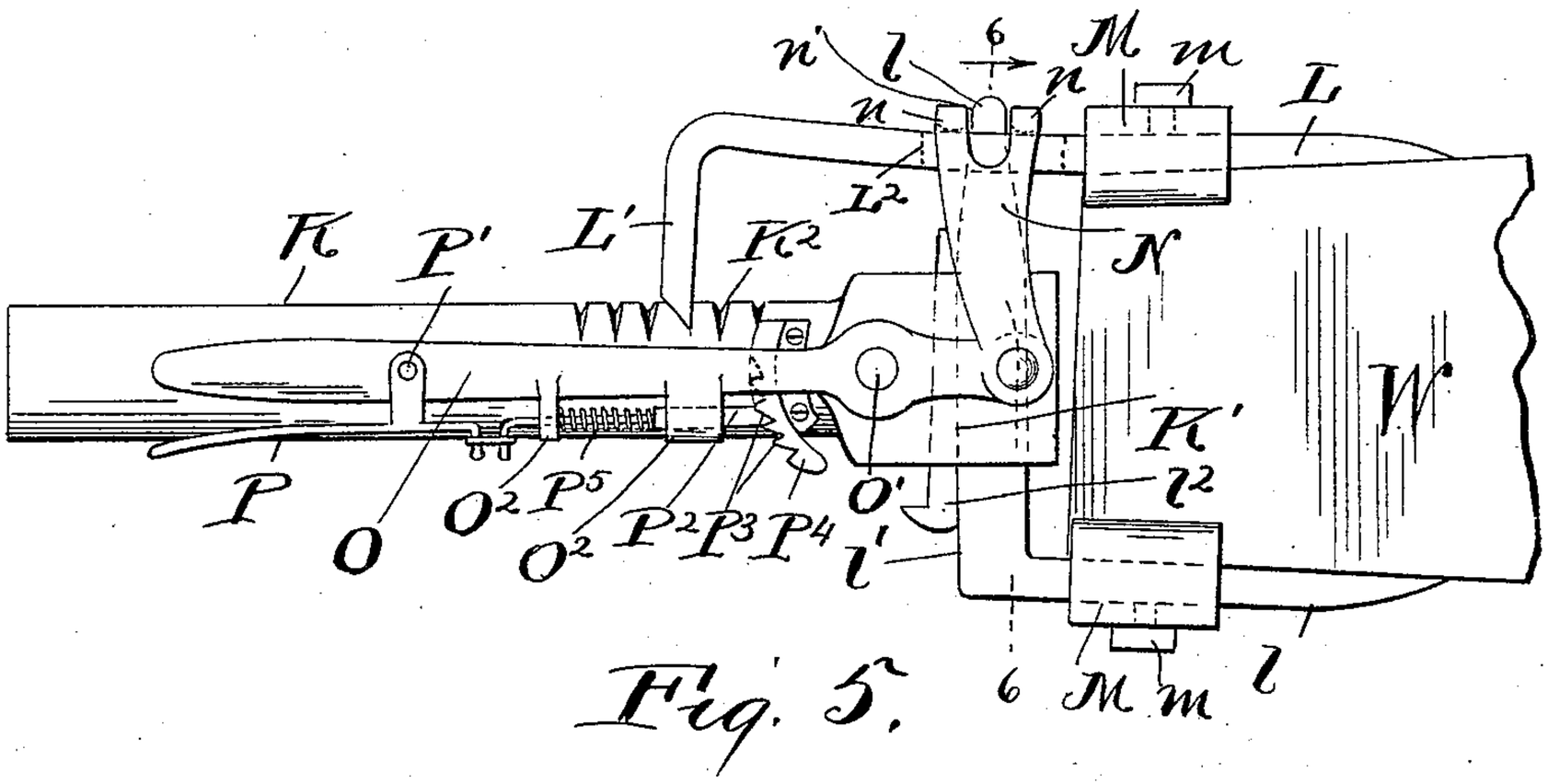

Fig. 5.

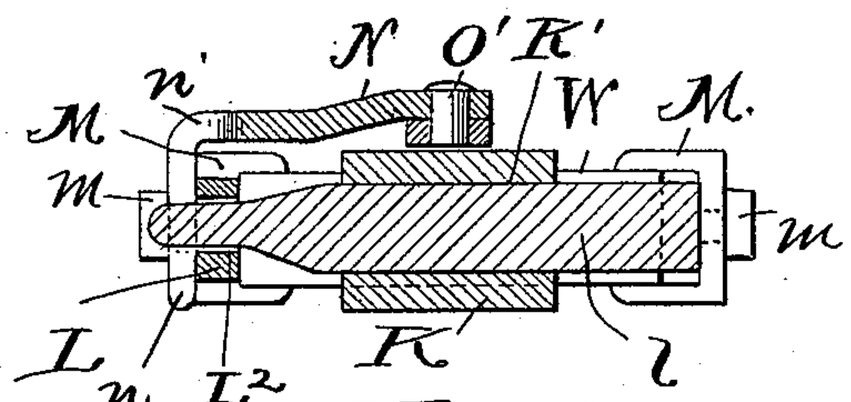

Fig. 6.

Witnesses,
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C. Howard

Inventor.
Silas Du Perow
By M. D. Leggett & Co
his attorneys.

UNITED STATES PATENT OFFICE.

SILAS DU PEROW, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO SOLOMON H. SCHMUCK, OF SAME PLACE.

GRINDING AND FACING OR POLISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 541,661, dated June 25, 1895.

Application filed January 5, 1895. Serial No. 533,949. (No model.)

To all whom it may concern:

Be it known that I, SILAS DU PEROW, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Grinding and Facing or Polishing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in machines for grinding and facing or polishing the heads or working members of such tools or implements as axes, adzes, hatchets, &c., the primary object being to construct a machine capable of satisfactorily and economically doing the work indicated.

With this object in view, and to the end of rendering the construction as simple and convenient as possible, my invention consists in the arrangement and combinations of parts hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is a top plan of a machine embodying my invention. Fig. 2 is a front side elevation, and Fig. 3 is a right hand side elevation relative to Figs. 1 and 2. Portions are broken away in said figures to reduce their size. Fig. 4 is a vertical section, in detail, on line 4—4, Figs. 1 and 2, showing also gears H^2, I^2 and S, and showing gear S partly broken away to exhibit, in solid lines, a portion of the notched disk S^2. Fig. 5 is an enlarged top plan of means instrumental in holding the work to be ground and faced or polished. Fig. 6 is a transverse vertical section on line 6—6, Fig. 5.

Referring to the drawings A designates the supporting-frame of my improved machine, and B represents a suitably supported shaft that is arranged horizontally and extends rearwardly from the forward side of the machine, said shaft, at the rear of the machine, being provided with a driving-pulley *b* to which power is applied in any approved manner. Shaft B, at its forward end, is shown provided with a crank B′, which, as will hereinafter appear, is operatively connected with the work-holder in such a manner as to reciprocate the work longitudinally over the grinding and facing or polishing surface during the operation of the machine.

D designates the grinding-wheel or disk, upon the periphery whereof the work is ground and faced or polished. The grinding-wheel or disc is operatively mounted upon a suitably supported horizontally arranged shaft *d* located at a suitable elevation. Shaft *d* is located a suitable distance at one side of and is arranged parallel with shaft B. Shaft *d* is shown provided with a driving-pulley *d′* to which power is applied in any approved manner.

The work to be ground and faced or polished is, during the grinding and facing or polishing operation, reciprocated longitudinally over the rotary grinding and facing or polishing surface, and, simultaneously with such longitudinal movement, is also reciprocated transversely of the grinding and facing or polishing surface. The work is, furthermore, capable of being turned about so as to bring either side thereof in contact with the grinding and facing or polishing surface, and means whereby the work is capable of oscillation, and means whereby pressure can be brought upon the work, during the operation of the machine, are also provided.

Referring, first, to the means or mechanism employed for effecting the longitudinal reciprocation of the work during the grinding and facing or polishing operation, I would remark that the same comprises an upright oscillating arm or lever E, (see Figs. 2 and 3) from the upper end whereof the former and work-holders are pivotally supported. Lever E is fulcrumed at E′ to a longitudinally-reciprocating bar or carriage F, and is capable of oscillation in a vertical plane at right angles to the axis of the grinding and facing or polishing-wheel or disk, said lever being located at a suitable point between shafts B and *d*, and bar or carriage F being arranged horizontally and parallel with shafts B and *d*. Lever E, preferably at or near its fulcrum, is provided with an arm E^2 that extends downwardly and in the direction of shaft B. Bar or carriage F (see Fig. 3) has suitable bearing in boxes *f* rigid with the supporting-frame, and, at or near its rear end, is operatively

connected, by means of a link F′ with the wrist F^2 of the crank F^3 of the suitably supported crank-shaft F^4 that is arranged at right angles to shaft B and is intergeared with said shaft B, preferably by means of a worm-wheel F^5 on shaft F^4, and in mesh with a worm B^3 on shaft B.

By the construction thus far described, it will be observed that, upon the actuation of shaft B, the former and work-holders, hereinafter described and borne by lever E as already indicated, will be reciprocated both longitudinally and laterally, resulting in the movement of the work transversely as well as longitudinally over the grinding and facing or polishing surface. Lever E, being carried by reciprocating bar or carriage F, is operatively connected with the crank of shaft B in such a manner as to accommodate the movement of the lever with the carriage. For instance, as shown very clearly in Fig. 1, arm E^2, at its outer end, bears a round rod or bar e^2 that is arranged parallel with the axis of lever E and is easily embraced by the lower end of link E^3.

Lever E, at its upper end, terminates in a U-shaped frame *e* shown more clearly in Fig. 3. Between the free ends of said U-shaped frame is pivotally supported a bar or piece G that is arranged parallel with the axis of the grinding-disk or wheel. Bar or piece G is bored laterally at two points located a suitable distance apart, as at *g*, to afford bearing for shafts H and I arranged at right angles to bar or piece G. (See also Fig. 4.)

Shafts H and I, at those ends of their bearings *g* that present toward the grinding and facing or polishing-wheel or disk, terminate in sleeves or holders H′, I′, respectively. Sleeve I′ is engaged internally by the shank or stem J′ of the former J that is composed of any suitable metal or material and, in shape or contour, is a counterpart of the work when the latter is ground and faced or polished as required. Former J rests upon the peripheral surface of a segment or rest J^2, preferably supported as hereinafter indicated and whose radius is preferably equal to the radius of the grinding and facing or polishing-disk or wheel. Former J is adjustable endwise of sleeve I′ and is secured in the desired adjustment by means of a set-screw J^3, that engages the shank or stem of the former through a corresponding hole in the supporting-sleeve or holder.

Sleeve or holder H′ is engaged internally by a bar K. (See Figs. 5 and 6.) Two bars or jaws L and *l* are adapted to engage opposite edges, respectively, of the work, and each of said jaws bears a clip M that is adapted to embrace the adjacent portion of the work and is adjustably secured to the respective jaw by means of a set-screw *m*.

W designates the work which, in the case illustrated, is an ax-head.

Jaw L is adjustable endwise to accommodate different lengths of work and, at one end is provided with a dog L′ that is adapted to engage any one of a series of notches K^2 in and arranged at suitable intervals lengthwise of bar K.

Bar K, at or near its outer end, is shown bored laterally and horizontally, as at K′, for the reception of an arm *l′* of jaw *l*, and a key l^2 for securing said jaw in its work engaging or operative position. Arm *l′* is shown extending through a slot L^2 in jaw L (see Fig. 6) and into or through the slot *n′* in the forked end *n* of a link or bar N that is operatively connected with a horizontally-arranged or approximately horizontally-arranged and swinging hand-lever O fulcrumed at O′ to bar K, preferably at or near the outer end of said bar K. The forked end of link or bar N is bent downwardly to engage the outer side of jaw L, as shown in Fig. 6, so that when lever O is actuated in the direction required and secured in the desired adjustment jaw L shall be caused to tightly engage the work and its dog L′ shall be secured in its engagement with the respective notch K^2 in bar K, and thereby positively prevent any endwise displacement of said jaw L.

The means employed for locking lever O in its operative position is preferably as follows: A tilting-lever P is fulcrumed at P′ to lever O, adjacent to the handle of said lever O, and is operatively connected in any approved manner with a reciprocating bolt P^2, that is arranged parallel with hand-lever O, and has suitable bearing in boxes O^2 rigid with said lever, the bolt being adapted to engage any one of a series of notches P^3 in a segment P^4 rigid with bar K, and a spring P^5, that is confined upon said bolt, acts in the direction to retain the bolt in its locking or operative position. It will be observed, therefore, that the ground and faced or polished work, upon unlocking lever O, as required to loosen the grip of jaws L′ upon the work, can readily be removed and new work introduced.

Q designates a pressure-bar that (see Figs. 1, 2 and 3) is adapted to engage the upper side of the former and work, and is operatively connected, at its central portion, preferably by means of a cable or flexible connection Q′ with a foot-lever Q^2 that, at one end, is fulcrumed, as at Q^3, to the floor below, and, at its opposite end, terminates in a treadle Q^4. Hence, more or less pressure is brought to bear upon the work according as more or less pressure is placed upon treadle Q^4.

Suitable means for elevating and lowering the former, and consequently lifting or lowering the work relative to the grinding and polishing wheel or disk is provided, and consists preferably (see Figs. 2 and 3) of an upright bar R engaging the under side of and preferably integral with the former-support J′, said bar extending downwardly through boxes *a′* rigid with a stationary upright or standard *a*, and resting upon an arm or lever *r′* operatively mounted upon an oscillating-shaft *r* that is arranged horizontally and supported

in any approved manner. Shaft r, at the forward side of the machine, in suitable proximity to treadle Q^4, is provided with a hand-lever r^2, by manipulating which shaft r can be oscillated in the one direction or the other as required to elevate or lower the former, and to lift or lower the work relative to the grinding and facing or polishing surface. The weight of member J′ and its supporting-bar will retain shaft r and levers r' and r^2, in their normal position. The work, by elevating the former the distance required, can be disengaged from the grinding and facing or polishing-surface, and the work can be ground more or less by more or less lowering the former, said movement of the former and work being entirely under the control of the operator or attendant.

The work is secured in the desired longitudinal adjustment relative to the grinding and facing or polishing-wheel or disk by means (see Figs. 1 and 2) of a set-screw K^3 that engages bar K through a correspondingly threaded hole in the sleeve or holder H′.

Having described the means employed for reciprocating the work over the grinding and facing or polishing-surface and the operative connection of the work-holding devices with the former that is capable of being elevated or lowered at pleasure, I will next refer to the means establishing operative connection between shafts H and I in such a manner that any oscillating motion communicated to the former-bearing-shaft I, shall be transmitted to the work-bearing-shaft H. In order to properly grind and face or polish curved surfaces, an oscillating motion must be given to the work during the operation of the machine.

The means, just referred to, for establishing operative connection between shafts I and H, consist preferably of gears I^2 and H^2, operatively mounted upon shafts I and H, respectively, and an intermediate gear S meshing with both of said gears H^2 and I^2 and loosely mounted upon a shaft S′ that has bearing at g' in bar or piece G. It will be observed, therefore, that by giving intermediate gear S a partial turn or rotation in the one direction or the other, gears I^2 and H^2 and connected parts will be turned in the one direction or the other, and it is also obvious that by the actuation of the gears just described, the work-bearing-shaft H will turn in the same direction with the former-bearing-shaft I, and consequently the work will be turned in unison with the former, in the actuation of the aforesaid gears. Motion, for the actuation of gear S, is preferably communicated from reciprocating-bar or carriage F, and the intermediate mechanism employed for the purpose is preferably as follows: Before proceeding to refer to the means employed for communicating motion to gear S, I shall describe the mechanism I employ for reciprocating the work transversely of the grinding and facing or polishing surface, during the operation of the machine, by which movement of the work the entire width of said grinding and facing or polishing surface is equally utilized, which is much desired. Reciprocating-bar or carriage F, preferably at or near its central portion, (see Figs. 2 and 3) has a depending arm F^6, provided with a laterally-projecting pin or member F^7, adapted to engage the end-walls t' of a slot or hole t in the lower arm of an upright tilting-lever T that is fulcrumed at T′ to a member of the supporting-frame, said slot or hole being arranged transversely of the lever. The upper arm of tilting-lever T, preferably at or near its upper extremity, has attached two cables T^2 that lead in opposite directions, respectively, to and over pulleys T^3 borne by the supporting-frame, and thence downwardly to weights T^4 that are suitably attached to the cables, said weights being adapted to rest upon lugs or members A′ of the supporting-frame in the normal or vertical position of lever T, (shown in Fig. 3,) and serving to steady the operation of the lever and connected mechanism in the operation of the machine. A spring T^5 acts in the direction to retain lever T in its vertical or normal position, said spring being shown attached to the lower arm of the lever and to the floor below. The upper arm of lever T is operatively connected, by means of a link U, with the lower end of an upright lever V, that, at its upper end, is fixed to shaft S′, in any approved manner. A disk S^2 is operatively connected, and preferably integral with gear S, and said disk is provided with one or more radially-arranged notches S^3 adapted to be engaged by a latch or locking-lever S^4 that is fulcrumed, as at S^5, to an upright arm formed upon shaft S′. A spring S^6 acts in the direction to retain said latch or lever in its locking or operative position.

It will be observed that, in the locking or operative position of latch or lever S^4, operative connection is established between gear S and its supporting-shaft S′ and consequently between said gear and tilting-lever T, and hence, as said tilting-lever is actuated in opposite directions, alternately, by the engagement of pin or member F^7 on member F^6 of reciprocating bar or carriage F with the opposing end-walls, alternately, of slot or hole t in said lever, gear S, and consequently the former and work, will be oscillated as desired during the grinding and facing or polishing operation. By disengaging latch S^4 from gear S, the former and work can be given a complete half turn as required to operate upon opposite sides of the work.

The machine herein described is, it will be observed, simple and durable in construction, reliable in its operation, and under the complete control of the attendant. The entire width of the grinding surface is utilized and the work is ground and faced or polished with great facility and accuracy.

I would remark that lever r^2 is preferably provided with any approved mechanism (not shown) for holding it in the desired adjust-

ment. For instance, mechanism, like that employed in connection with lever O, for securing said lever O in the desired adjustment, would be suitable for use in connection with lever r^2.

What I claim is—

1. The combination of a suitably rotated grinding and facing or polishing disk or wheel, suitably actuated tilting or oscillating lever E, said lever, at its upper end, terminating in a U-shaped frame *e*, a bar or piece G pivotally supported between the end-members of said U-shaped frame, work-holding jaws L *l* adapted to engage opposite edges, respectively, of the work to be ground and faced or polished, said jaws being suitably supported from the aforesaid pivotally supported bar or piece, suitable means for causing the jaws to tightly engage or seize the work, and means for loosening the grip of the jaws upon the work, substantially as set forth.

2. The combination with a suitably supported and actuated grinding and facing or polishing disk or wheel, of a suitably actuated tilting or oscillating lever E, a bar or piece G pivotally supported from said lever and arranged parallel with the axis of the aforesaid disk or wheel, a shaft H journaled in said pivotally supported member and arranged at right angles or approximately at right angles to the axis of the aforesaid disk or wheel, said shaft being provided with a sleeve or socket H′, bar K removably secured within said sleeve or socket, said bar K being provided with a series of notches K^2 and bored laterally at or near its outer end, as at K′, work-engaging jaws L *l* provided with a dog L′ and arm *l*′, respectively, clips M and set-screws *m*, hand-lever O, forked link N, lever P, bolt P^2, notched segment P^4 and spring P^5, all arranged and operating substantially as shown, for the purpose specified.

3. In combination, a suitably supported and actuated grinding and facing or polishing disk or wheel, a suitably actuated tilting or oscillating lever E, a bar or piece G pivotally supported from said lever and arranged parallel or approximately parallel with the axis of the grinding and facing or polishing-disk or wheel, former-bearing shaft I, and work-bearing shaft H, said shafts being journaled in the aforesaid pivotally supported bar or member and arranged substantially as indicated, a rest J^2 for the former, and means for elevating and lowering said rest, all arranged and operating, substantially as and for the purpose set forth.

4. In combination, a suitably-actuated grinding and facing or polishing disk or wheel, suitably actuated upright tilting or oscillating-lever E, former-bearing shaft I and work-bearing shaft H, said shafts being suitably supported from the upper end of the aforesaid lever and the former-bearing-shaft and work-bearing shaft being operatively connected with each other in such a manner as to be capable of being simultaneously oscillated, all arranged and operating substantially as and for the purpose set forth.

5. The combination with a suitably supported and actuated grinding and facing or polishing wheel or disk, of a suitably actuated upright tilting or oscillating lever E, a bar or piece G arranged parallel or approximately parallel with the axis of the aforesaid disk or wheel and pivotally supported from the aforesaid lever, former-bearing shaft I, work-bearing shaft H and an intermediate shaft S′, said shafts being journaled in the aforesaid pivotally-supported bar or piece, gear I^2 operatively connected with the former-bearing shaft, gear H^2 operatively connected with the work-bearing shaft, gear S loosely mounted upon the intermediate shaft S′ and meshing with the aforesaid gears H^2 and I^2, means for oscillating said intermediate shaft, and means for establishing operative connection between said shaft and the gear loosely mounted thereon, all arranged and operating substantially as and for the purpose set forth.

6. In combination, a suitably supported and actuated grinding and facing or polishing-disk or wheel, a suitably-actuated tilting oscillating lever E, a former-bearing-shaft and a work-bearing-shaft supported from said lever in such a manner as to be capable of oscillation, means for simultaneously oscillating said shafts, a pressure-bar adapted to engage the work and former from above, and means for actuating said bar vertically, all arranged substantially as shown, for the purpose specified.

7. The combination with a suitably-actuated grinding and facing or polishing-disk or wheel, of means for holding the work during the grinding and facing or polishing operation and mechanisms for reciprocating the work both longitudinally and transversely of the grinding and facing or polishing surface and for oscillating the work during the operation of the machine, substantially as set forth.

8. The combination with a suitably actuated grinding and facing or polishing disk or wheel, of a suitably actuated longitudinally reciprocating carriage F, a suitably actuated upright tilting or oscillating lever E borne by said carriage, oscillating work-bearing shaft H, a bearing *g* for said shaft, said bearing being pivotally supported from said lever and arranged parallel with the axis of the aforesaid disk or wheel the work-bearing shaft being arranged at right angles or approximately at right angles to said axis, and means for oscillating said shaft, all operating substantially as and for the purpose set forth.

9. The combination with a suitably-actuated grinding and facing or polishing-disk or wheel, of a suitably-actuated longitudinally reciprocating carriage F arranged parallel or approximately parallel with the axis of said disk or wheel, a vibrating or oscillating lever E borne by said carriage, former-bearing shaft I, work-bearing shaft H, and intermediate shaft S′ and bearings for said shafts, said shafts being arranged parallel with each other

and at right angles or approximately at right angles to the axis of the aforesaid disk or wheel, the bearings for the shafts being rigid with each other and pivotally supported from the aforesaid lever, means for establishing operative connection between the intermediate shaft and work-bearing shaft and former-bearing shaft, mechanism for oscillating said intermediate shaft, and a member on the aforesaid reciprocating carriage for engaging and actuating said shaft-oscillating-mechanism, substantially as and for the purpose set forth.

10. The combination with a suitably-actuated grinding and facing or polishing-disk or wheel, of a suitably-actuated longitudinally-reciprocating carriage F arranged parallel or approximately parallel with the axis of said disk or wheel, a vibrating or oscillating lever E borne by said carriage, former-bearing shaft I, work-bearing shaft H, intermediate shaft S′, and bearings for said shafts, said shafts being arranged parallel with each other and at right angles or approximately at right angles to the axis of the aforesaid disk or wheel, the bearings for the shafts being rigid with each other and pivotally supported from the aforesaid lever, means for establishing operative connection between the intermediate shaft and former-bearing shaft and work-bearing shaft, upright tilting-lever T the lower arm whereof is provided with a transversely-arranged slot or hole *t*, and the upper arm whereof is operatively connected with the aforesaid intermediate shaft in such a manner that the shaft is actuated in the one direction or the other according as the lever is tilted in the one or the other direction, suitable means acting to retain said tilting lever T in its normal position, and a laterally-projecting pin or member F^7 borne by the aforesaid reciprocating carriage and adapted to engage the end-walls of the aforesaid slot or hole, all operating substantially as shown, for the purpose specified.

11. In a grinding and facing or polishing-machine, the combination with a suitably-supported work-bearing-shaft, and a gear operatively mounted upon said shaft, of a shaft S′ arranged parallel with the work-bearing-shaft, gear S loosely mounted upon said shaft S′ and meshing with the aforesaid gear on the work-bearing-shaft, mechanism for oscillating said shaft S′, and means for establishing and interrupting operative connection between gear S and its supporting shaft, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 19th day of November, 1894.

SILAS DU PEROW.

Witnesses:
C. H. DORER,
L. WARD HOOVER.