(No Model.) 4 Sheets—Sheet 1.

W. ALLDERDICE.

MACHINE FOR DRAWING METAL RODS OR BARS.

No. 323,619. Patented Aug. 4, 1885.

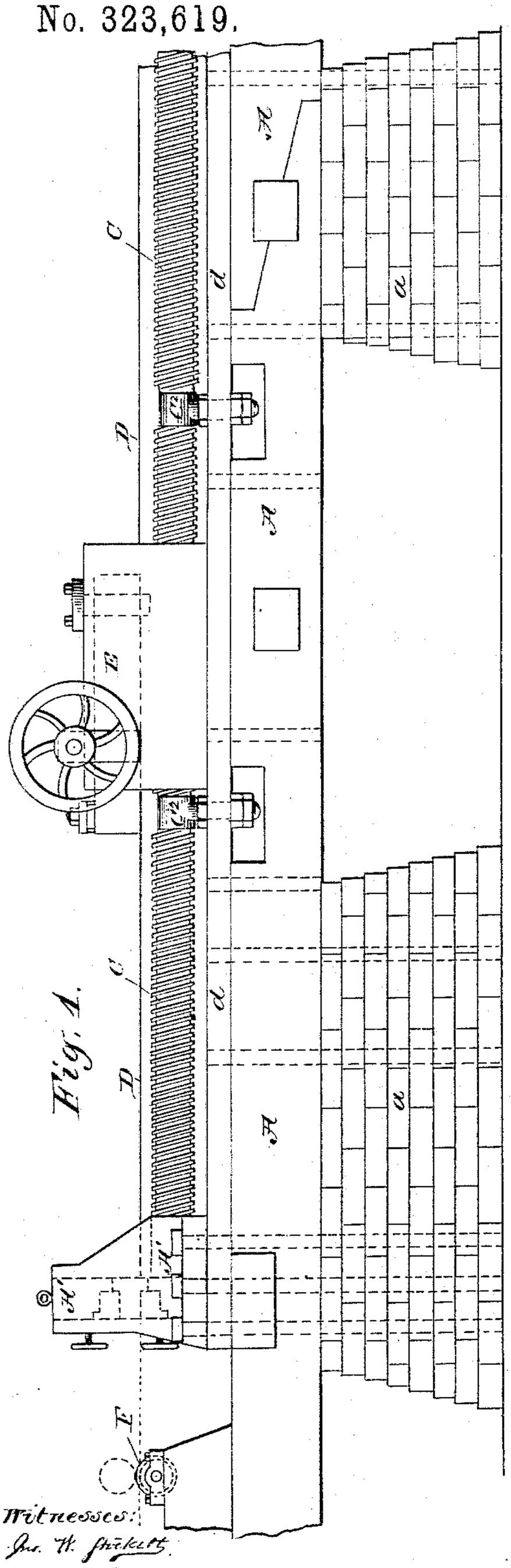


Fig. 1.

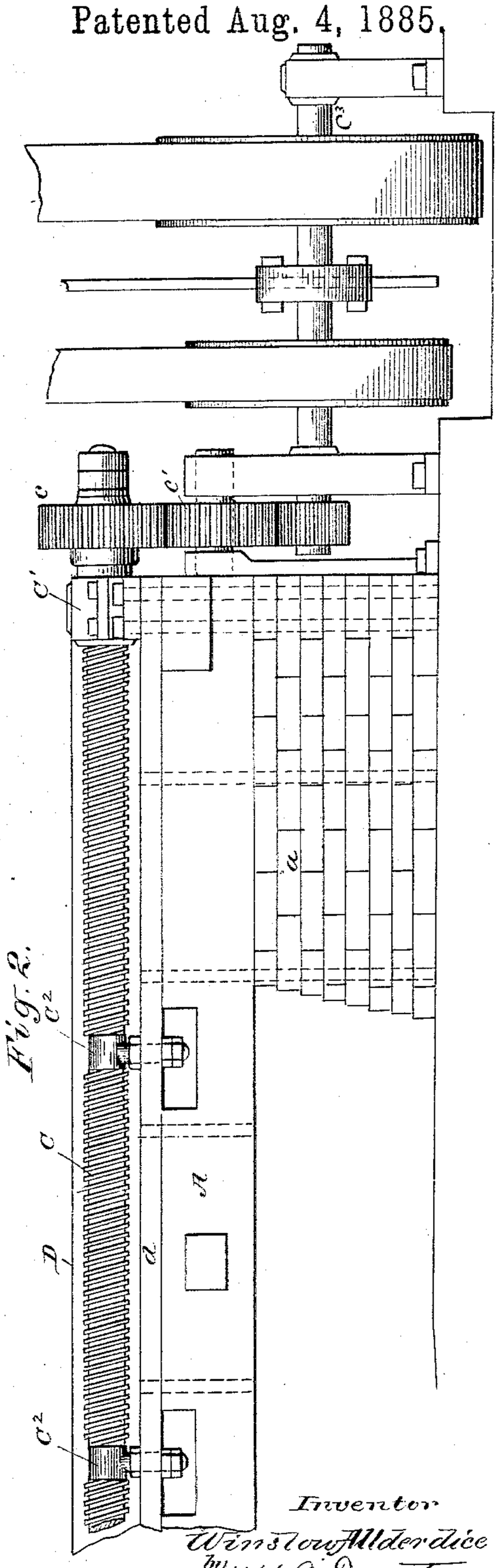


Fig. 2.

Witnesses:
Jas. H. Stikeleather
C. C. Poole

Inventor
Winslow Allderdice
by W. C. Dayton
Attorney.

(No Model.) 4 Sheets—Sheet 2.

W. ALLDERDICE.

MACHINE FOR DRAWING METAL RODS OR BARS.

No. 323,619. Patented Aug. 4, 1885.

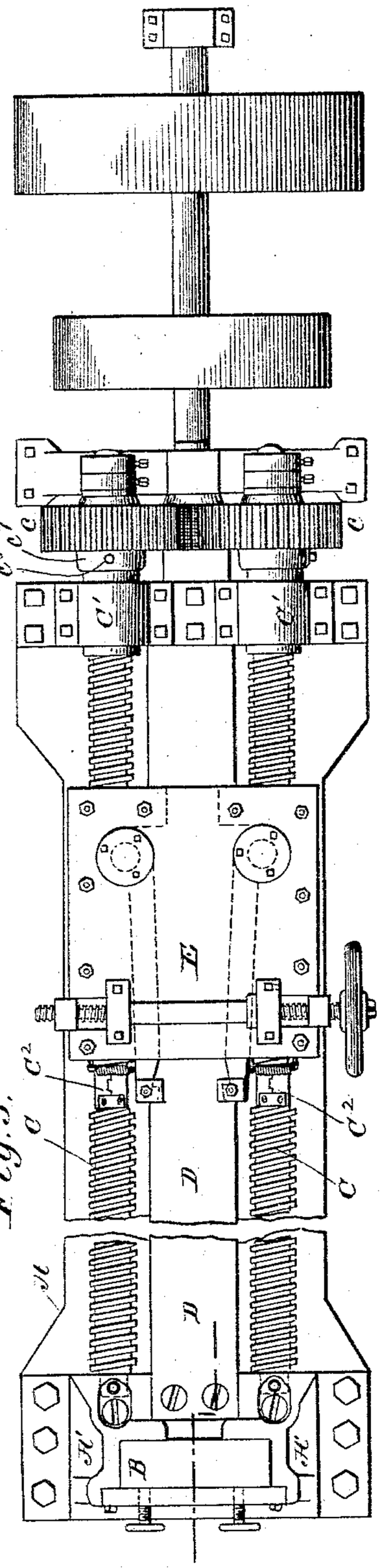


Fig. 3.

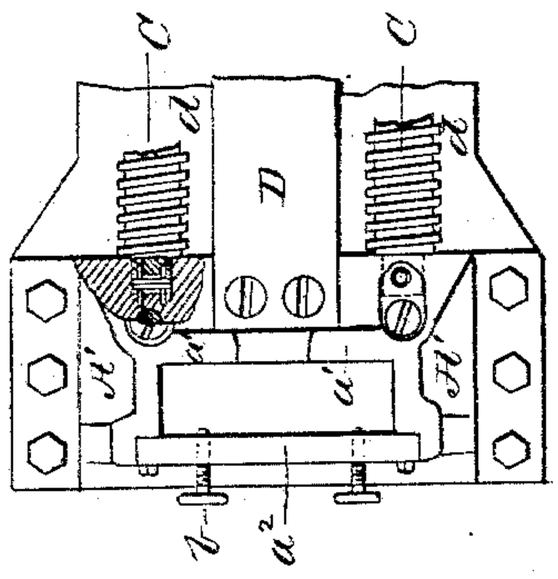


Fig. 3a.

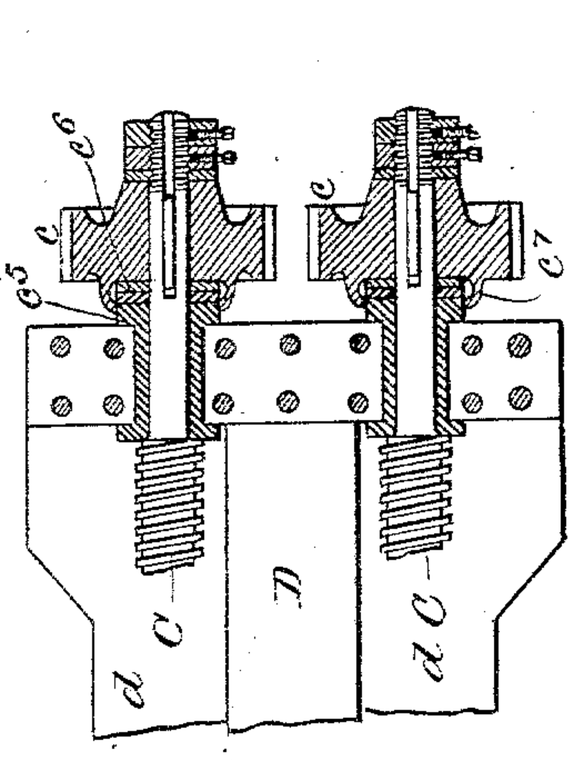


Fig. 3b.

Witnesses:
Jno. H. Stockett
C. C. Poole

Inventor:
Winslow Allderdice
by M. E. Dayton
Attorney

(No Model.) 4 Sheets—Sheet 3.

W. ALLDERDICE.

MACHINE FOR DRAWING METAL RODS OR BARS.

No. 323,619. Patented Aug. 4, 1885.

Fig. 4.

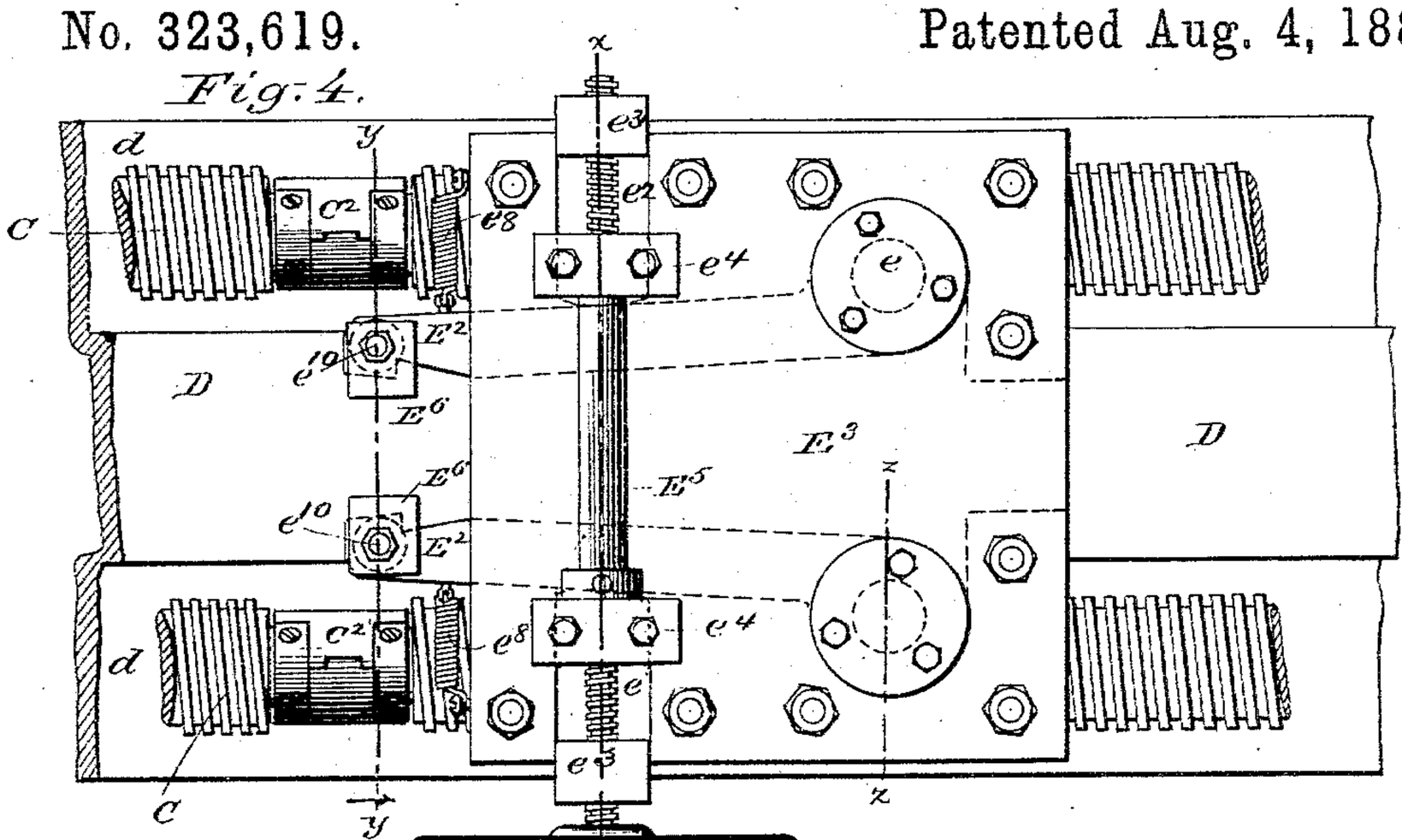


Fig. 5.

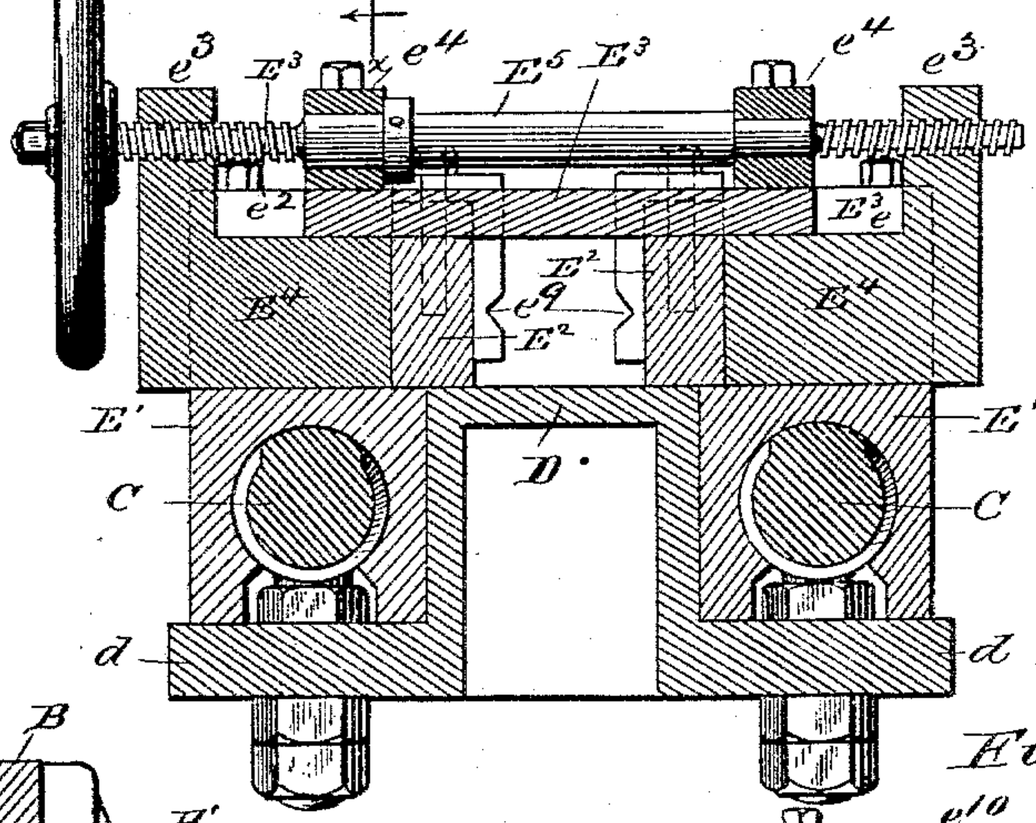


Fig. 6.

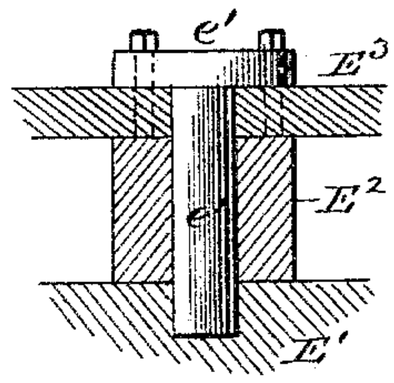


Fig. 8.

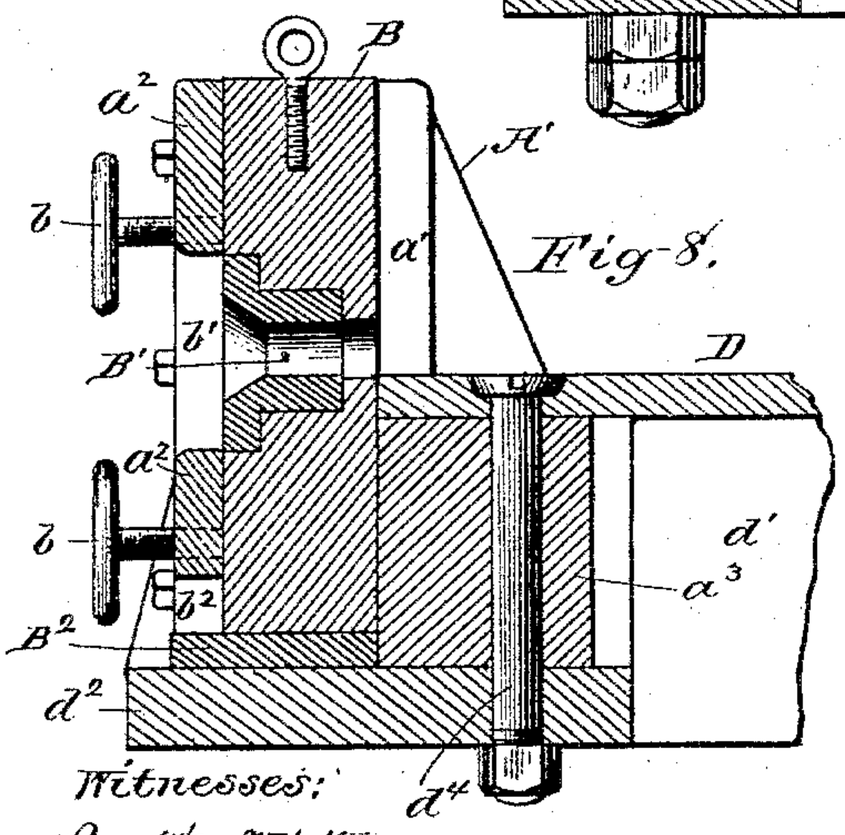
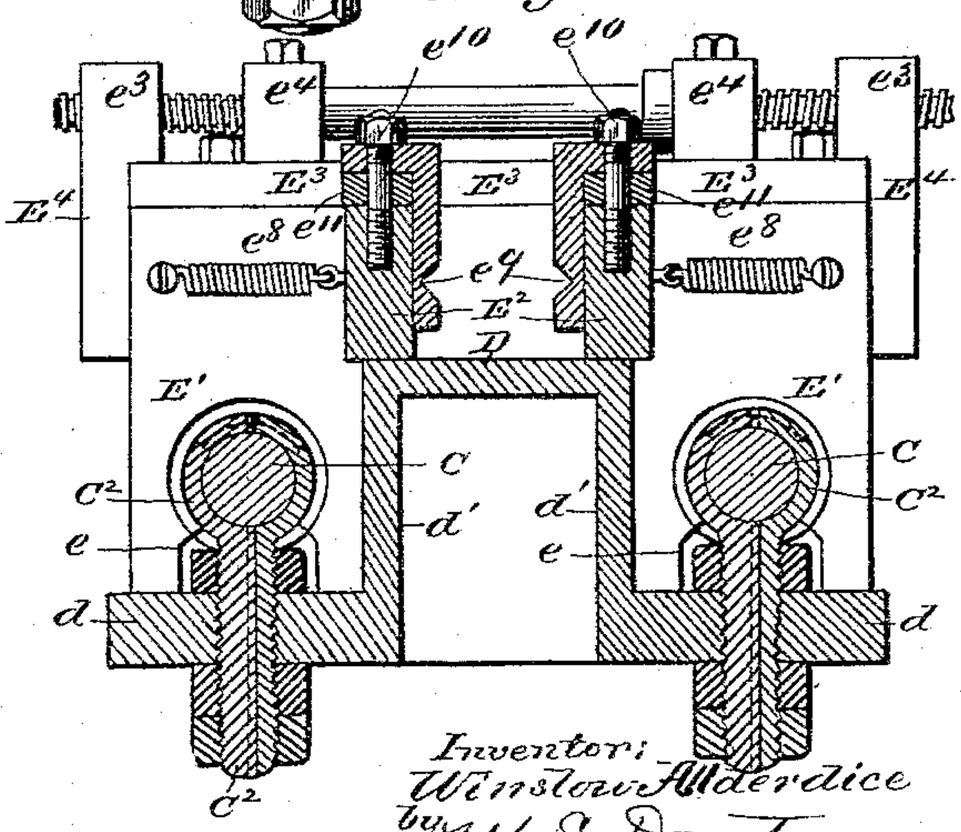


Fig. 7.



Witnesses:
Jno. W. Stockett.
C. C. Poole

Inventor:
Winslow Alderdice
by W. E. Dayton
Attorney

(No Model.) 4 Sheets—Sheet 4.

W. ALLDERDICE.

MACHINE FOR DRAWING METAL RODS OR BARS.

No. 323,619. Patented Aug. 4, 1885.

Fig. 9.

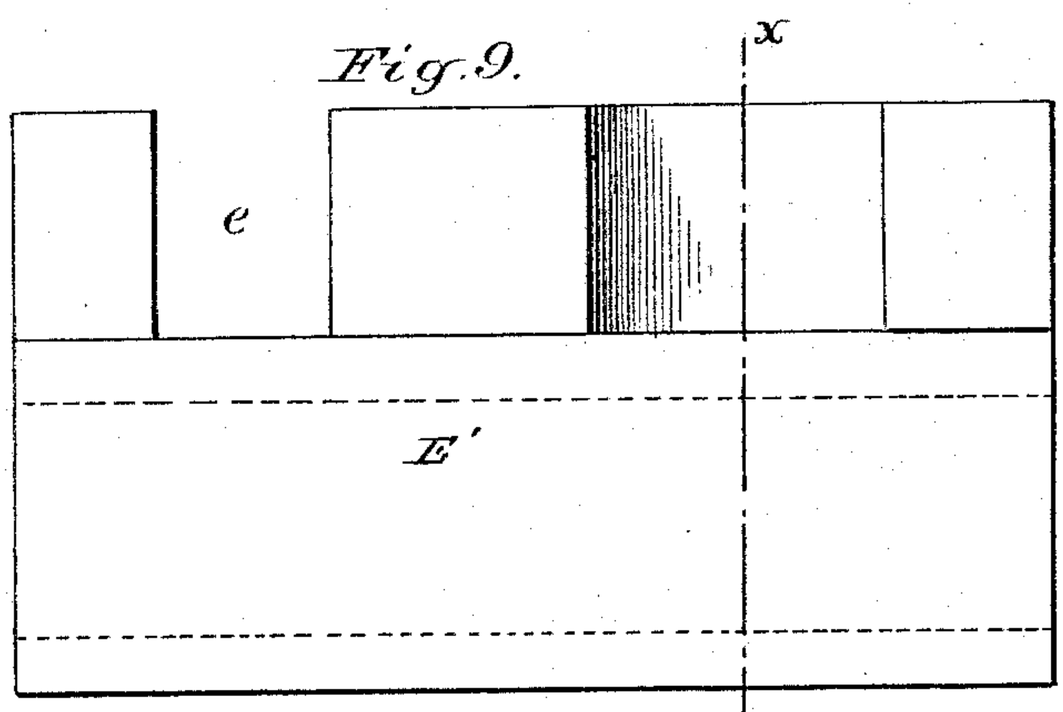


Fig. 10.

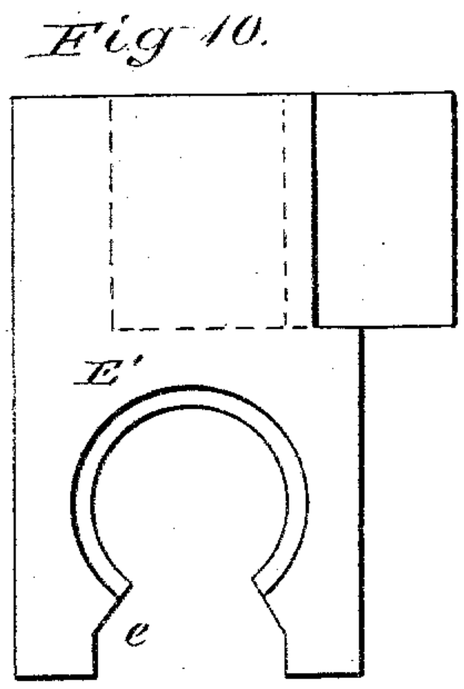


Fig. 11.

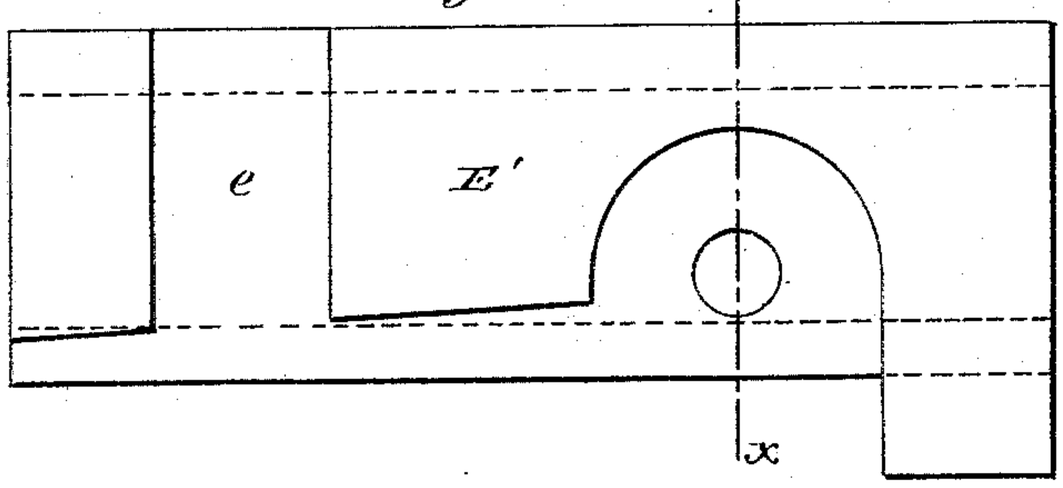


Fig. 12.

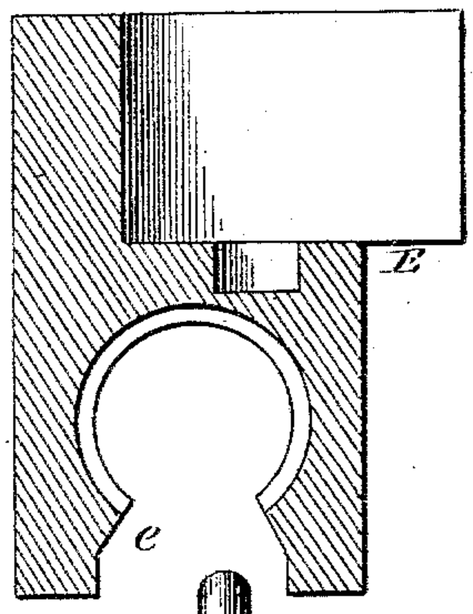


Fig. 13.

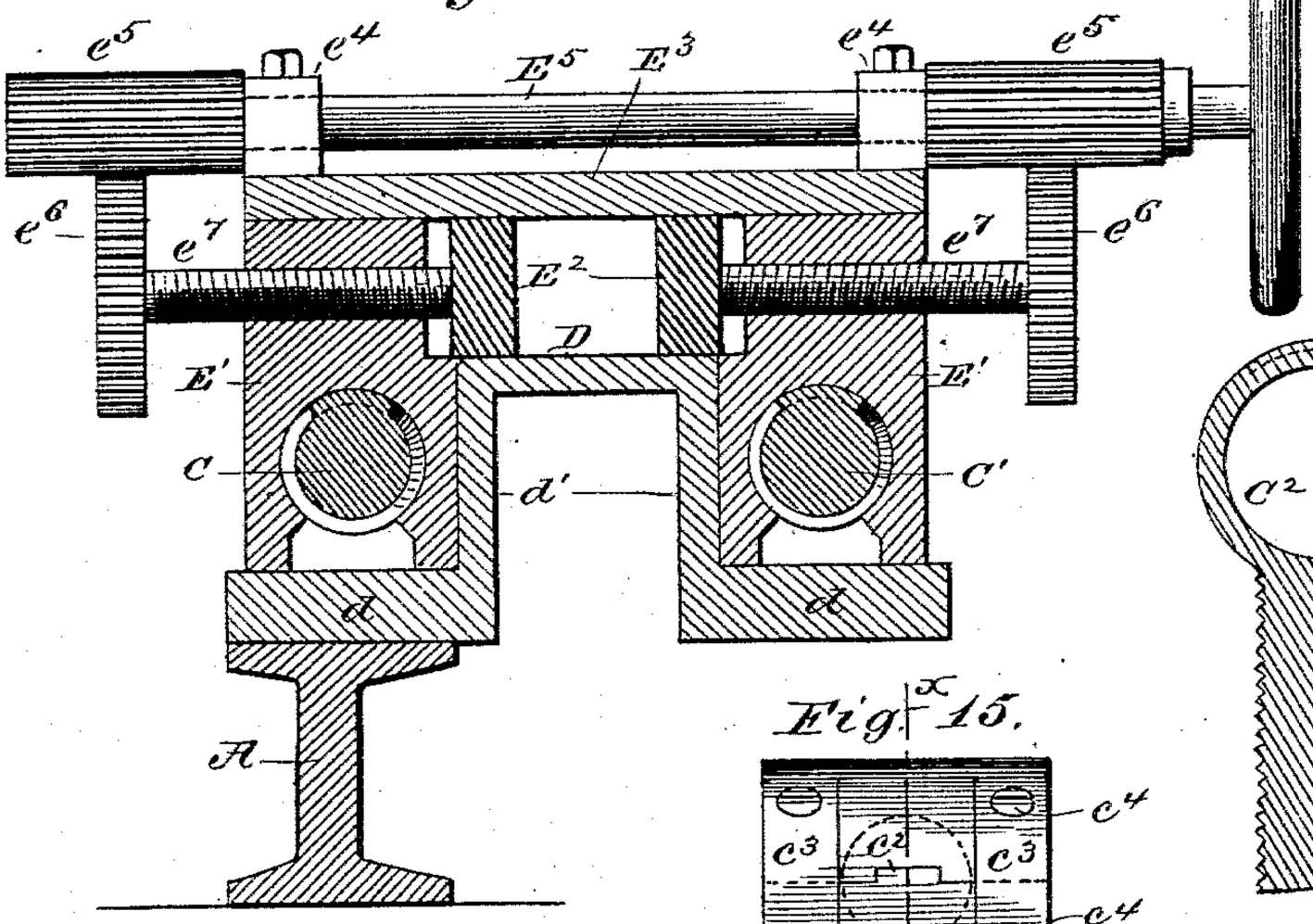


Fig. 14.

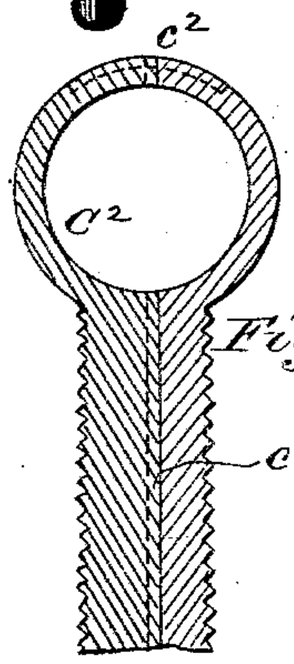


Fig. x 15.

Witnesses:
Jno. H. Stockett.
C. C. Poole

Inventor:
Winslow Allderdice
by H. E. Dayton.
Attorney

UNITED STATES PATENT OFFICE.

WINSLOW ALLDERDICE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE AGNEW SHAFTING COMPANY, OF SAME PLACE.

MACHINE FOR DRAWING METAL RODS OR BARS.

SPECIFICATION forming part of Letters Patent No. 323,619, dated August 4, 1885.

Application filed April 2, 1884. (No model.)

To all whom it may concern:

Be it known that I, WINSLOW ALLDERDICE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Drawing Metal Rods or Bars; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to machines for drawing metal shafting or heavy rods or bars through suitable dies for the purpose of compressing the metal, finishing the surface, and securing a uniform diameter of the shaft or rod throughout its length.

The object of the invention is to provide a construction by which the drawn shaft or rod shall be not only of uniform diameter and properly finished, but also perfectly straight, so that additional machinery for the purpose of straightening the shaft after drawing may be dispensed with, or at least the labor of subsequent straightening very materially reduced.

The invention consists in the several matters hereinafter set forth, and pointed out in the appended claims.

In the drawings, Figures 1 and 2 together present a side elevation of my improved machine, showing the ends only, the central portion being broken out. Fig. 3 is a plan view, on a smaller scale, similarly broken away between the ends of the machine. Figs. 3^a and 3^b are longitudinal sections showing the end bearings of the carriage-propelling screws. Fig. 4 is a plan view of the carriage which carries the drawing-jaws, with a subjacent part of the stationary machine. Fig. 5 is a vertical transverse section of the carriage and subjacent parts of the machine in line *x x* of Fig. 4, and looking in the direction of the arrow on said line. Fig. 6 is a detail in vertical transverse section in the line *z z* of Fig. 4. Fig. 7 is a vertical transverse section in the line *y y* of Fig. 4. Fig. 8 is a fragmentary vertical section in the axis of the die when in place in the machine. Fig. 9 is a side view of one of the nuts of the carriage, looking at its inner face. Fig. 10 is a front end view of the nut shown in Fig. 9. Fig. 11 is a plan or top view of the nut shown in Fig. 9. Fig. 12 is a transverse vertical section of the nut in line *x x* of Figs. 9 and 10. Fig. 13 is a transverse vertical section of a carriage in a line corresponding to the line *x x* of Fig. 4, said carriage of Fig. 13 differing from that shown in Fig. 4 in matters concerned in throwing the jaws inward. Fig. 14 is a central vertical section of one of the supports of the carriage-propelling screws taken in a line transverse to the screw, or in line *x x* of Fig. 15. Fig. 15 is a top view of one of the screw-supports shown in section in Fig. 14.

Heretofore in machines for drawing heavy metal rods or shafting no attempt has been made to produce a perfectly straight product in the act of drawing it, or by devices by which the drawing is effected, but only to produce the desired uniformity in transverse dimensions and a proper or approximate degree of surface-finish. It has, in fact, been usually found that the shaft after leaving the drawing-machine would be less straight than before; and all such drawn shafting has hitherto been subjected to the action of special devices for the purpose of straightening it in order to fit the product for use.

This invention proceeds on the assumption that if the rod is properly guided to and from the die, if the die is of proper construction, and if the drawing-strain is applied and continued accurately in the prolonged axis of the die, the drawn rod will be straight. To these ends provision is made in the machine herein described for supporting the die in fixed axial relation to the drawing mechanism, for giving the gripping-jaws of the drawing devices a movement accurately in line with the prolonged axis of the die, and for sustaining the drawn part of the shaft in a straight line against the action of gravity. The desired means for supporting the undrawn part of the rod in the prolonged axis of the die, or practically so, may also be included in the mechanism proper; or it may be a separate structure of any suitable kind properly arranged for the purpose. The die is preferably of such length in its more contracted work-

ing part or aperture as to insure against lateral offsets or deflections that might otherwise arise from unequally-dense places in the surface of the rod being drawn, though such defects being absent the aperture of the die need not be of excessive length.

Referring to the drawings, A A represent a strong rectangular frame or bed of the desired length permanently supported on suitably-firm foundations *a a*, Figs. 1 and 2.

A′ are two uprights, located at one end of the bed and on opposite sides thereof, for the rigid support of the die-block B. (Seen in dotted lines of Figs. 1 and 2, in top view in Fig. 3, and in central vertical section in Fig. 8.) Said uprights A′ are joined, as here shown, by a heavy cross-piece, a^3, cast in the same piece therewith.

C C are two heavy parallel screws arranged above the side pieces of the bed A, and supported at one end in the uprights A′, and at the other in bearings at C′ C′ on the opposite end of the machine.

C^2 C^2 are fixed supports for the screws C, located at suitable points in the length of the latter, and rising from the subjacent bed or frame.

D is a central table resting on or supported by the bed A in any manner suitable for permanence, but in the present instance provided with heavy lateral flanges *d*, fitted and fastened upon the frame A, and connected with the more elevated table D by the vertical flanges or webs *d′*. The table D is planed true on its upper surface, said surface being intended to support the drawn shaft, or drawn part of the shaft, in an accurately-straight line against the operation of gravity after it has left the die.

E is a carriage resting and sliding on the bed A, (or flanges *d* of the table D, as the case may be,) and laterally guided, as herein shown, by the outer faces of the vertical portion of the surfaces of the plate D *d′ d*, the guiding and supporting surfaces for said carriage being planed true and straight, so that said carriage will move accurately straight and parallel with a central line in the surface of the table D. The carriage E is drawn by engagement with the screws C C, as indicated in Figs. 1, 2, and 3, the depending and female threaded parts or nuts E′ of said carriage being slotted at *e* on their under sides to give passage for the standards of the fixed screw-supports C^2, hereinafter more fully described.

E^2 E^2 are two gripping-jaws attached to the carriage E for the purpose of seizing the end of the shaft and drawing it forward through the die B.

As shown in the present drawings, the carriage is composed of two originally separate parts, E′, called "nuts," severally provided with interior screw-threads to fit the screws C, and firmly joined together by means of a heavy top plate, E^3, bolted to their upper surfaces. To receive the jaws E^2 the upper inner portions of said nuts E′ are cut away or recessed, as indicated in Figs. 9 to 12, inclusive, and the pivot-pins *e′*, upon which said jaws vibrate, are let down through the top plate, E^3, through the jaws, and into the body of the nuts, in which position the pins are held by caps or heads secured by screws to the top plate in the manner indicated in Figs. 4 and 6.

The jaws E^2 are operated by means contrived to insure their equal and simultaneous movement toward the central line of the table D when they are brought into engagement with the rod, and to permanently hold the said jaws and rod in such position during the drawing movement of the carriage. Said jaw-operating devices are also contrived (with other parts) to afford free passage between the jaws and beneath the top plate of the carriage for a rod that has been drawn.

As one suitable means for operating the jaws E^2, Figs. 4, 5, and 7 of the drawings show opposite slides, E^4, arranged in transverse recesses e^2 of the nuts E′, and made to bear against the outer sides of the jaws E^2, as more plainly shown in Fig. 5. The outer ends of the slides are provided with upwardly-directed projections e^3, in which are fitted the oppositely-threaded ends of the shaft E^5, centrally supported and held from longitudinal movement by means of the stationary bearings and shoulders e^4 e^4 in an obvious manner.

In Fig. 13 another suitable construction is shown for advancing the jaws E^2, in which the rotary shaft is provided with long pinions e^5, which mesh with wheels on the right and left screws e^7, threaded through the nuts E′, in position to bear against the jaws E^2.

To retract the jaws, springs may be employed in any approved manner, one form of their application being illustrated in Figs. 4 and 7, wherein e^8 are contractile coiled springs having one end of each attached to the projecting end of one of the jaws, and the other end fastened to the adjacent face of the nut E′. By thus locating the springs, instead of placing them between the jaws, as would otherwise be done, the desired free space is left between the said jaws for the drawn rod, which is left resting on the table D while the carriage is being returned to the head of the machine.

The gripping ends of the jaws E^2 are desirably provided with movable steel jaw-plates E^6, the inner or hidden surfaces of which engage projections upon the jaws proper, as indicated in dotted lines of Fig. 4. Said jaw-plates are preferably provided with horizontal notches e^9, one opposite the other, intended to receive the neck formed on the end of the rod to be drawn, and to thus afford more extended bearing upon the head of said rod. The jaw-plates are vertically adjustable, in order that while the reduced end of the rod or shaft is held in the notches e^9 the body of the shaft may rest on the table D. The devices for this adjustment (shown in the drawings) consist of clamping-screws e^{10}, Figs. 4 and 7, passing down-

ward through lateral projections upon the upper ends of said jaws, and accurately-constructed washers e^{11}, the latter being provided in suitable numbers and of different thicknesses to give the desired variations in elevation of the jaws to suit the different sizes of shafts desired to be drawn.

The die-blocks B employed in the machine are all of equal dimensions, and are fitted to set down between the rear flanges, a', on the uprights A′ and the front plate, a^2, the former supporting the die-block against draft upon the shaft being drawn. In the front plate set-screws b b are fitted, which press the accurately-shaped block B firmly back against the adjacent surfaces of the flanges a', which are trued carefully to a plane at right angles with the planed surface of the table D. A central space or opening, b', is provided in the front plate, a^2, opposite the die proper, B′, and at the bottom a wide opening or space, b^2, is also provided to admit a suitable templet or liner, B^2, by which the lowermost surface of the die-aperture is brought accurately in line with the surface of the table D.

It is proposed, as a desirable construction, to make the die-blocks for drawing different sizes of shafts of the same height from the bottom to the axis of the die, and to provide a series of liners, B^2, severally equal in thickness to half the diameter of the aperture of the die with which it is to be used, so that the liner will bring the bottom of the die-opening into line with the table D, as stated.

C^2 are supports for the screws C, located at proper points to sustain said screws and to keep them straight. Said supports consist each of a sleeve and a standard or shank. The sleeve is externally of less diameter than the screw exclusive of the thread, and is fitted to embrace a neck or suitably-reduced portion of the screw-shaft, as indicated clearly in Fig. 7. The shank or standard of this screw-support is screw-threaded, and passes through the flanges d, being vertically adjustable by means of nuts above and below the flange in the familiar manner shown in Figs. 1, 5, and 7. The slot e in the nut gives passage to the latter over the standard, and the sleeve of the screw-support offers no obstruction to the passage of the nuts of the carriage along the screw by reason of the small exterior diameter thereof. The nut E′ of the carriage, being much longer than the sleeve, is not interrupted by the latter in its engagement with the screw. The screw-support C^2 is of course made in two parts to admit of its application to the reduced part of the screw. I prefer to divide said support vertically in the central plane of the shank, as indicated in Figs. 7, 14, and 15, one of the meeting-faces being tongued and the other correspondingly grooved, as shown at c^2, Figs. 14 and 15. To give greater strength to the sleeve, binding-straps c^3 cross the joint flush with the outer surface of the sleeve and are held by short strong screws c^4 or otherwise. The ends of the screws C C are desirably mounted in the uprights A′, or in the transverse part a^3 of the casting, of which said uprights in this instance form a part, and somewhat as shown in Fig. 3^a, in which a removable plate is set and pinned in the bottom of the bore which receives the end of the screw-shaft. Another removable plate is pinned to the end of said shaft, and two loose circular washer-plates, smaller than the bore, are interposed between said pinned plates, this being a familiar construction not of my invention. The opposite or rear ends of the screws are reduced and mounted in bearings in the cross-beam at the opposite end of the machine, as indicated in Fig. 3^b.

In order to divide the end-thrust of the screws between the bearings at their opposite ends, the driving-pinions c c, Fig. 3^b, are splined on the shafts C, and are held by external nuts, which may in turn be held by set screws. Between the inner faces of the pinions c c and the bearing-boxes c^5 are interposed washers c^6, by change of which the two screws may be separately adjusted, and also by means of which the effect of friction may be remedied in the usual way. As a novel device for supplying oil to the bearing-surfaces at this point, the pinions c are provided with flanges c^7, which extend inward beyond the washers, and which are interiorly hollowed to form a chamber for the retention of the lubricant. Oil may be introduced into this chamber through a hole stopped by a plug, as indicated at c^8 in Fig. 3. The screws C C are driven harmoniously by means of the equal pinions c, secured to the screw-shafts, an idle-spur, c', Fig. 2, meshing with both pinions, and any further gear that may be desired to give the required speed or power. In Fig. 2 the driving-shaft C^3 is employed, which is provided with two unequal belt-pulleys, on the smaller one of which the belt will be twisted to reverse the motion and increase the speed in returning the carriage E.

The devices above described are obviously constructed to apply and maintain the draft upon the rod or shaft accurately in the prolonged axis of the die, and to support the drawn portion of the shaft accurately in the line of draft. In addition to these provisions, I also employ means for supporting the undrawn part of the rod in line with the die, in order that no spring of the rod may extend into the die and produce a curve in the shaft as it emerges from the latter.

Any suitable devices may be used to hold the rod straight on its way to the die. In Fig. 1 is shown one grooved wheel, F, of a series set near each other and on the same level with each other and with the table D. Said wheels may be mounted on a prolongation of the bed A, as shown, or independently supported. Of course a table may be em-

ployed in place of said wheels, together with lateral guides for the rod, answering to the flanges of the grooved rolls; and, if desired, upper grooved rollers (indicated in dotted lines of Fig. 1) may be used in opposition to the rollers F or their equivalent table to more perfectly hold the rod straight as it advances to the die. The die proper, B′, Fig. 8, should have its aperture in its narrower portion of length equal to or greater than its diameter.

With respect to the general features of my invention, I wish it to be expressly understood that I am not limited to the specific devices herein shown, as other means may be employed for the special purposes of the several individual mechanisms shown. For example, a gripping mechanism, operating in suitable guides, may be drawn by a chain or rope and drum, and instead of a continuous plane table, D, a series of rollers may be employed whose upper surfaces are in line with each other and with the lower surface of the die-aperture.

In order that the rod as it emerges from the die may not be deflected by the gripping-jaws, which are constructed to apply the draft in the prolonged axis of the die, the reduced neck on the rod, which gives the head by which the said jaws hold and draw the rod, should be accurately concentric with the axis of the rod. Any special machinery may be employed to thus form the neck.

I claim as my invention—

1. The combination, with a die, a die-support, and means, substantially as described, for applying the draft on the rod in the prolonged axis of the die, of a guiding-support constructed to uphold the undrawn part of the rod in the prolonged axis of the die, substantially as and for the purposes set forth.

2. The combination, with a die and a support which holds the die with its axis in a horizontal position, of a table arranged in line with the lower surface of the die-aperture, and traveling gripping devices constructed to apply the draft in the prolonged axis of the die, substantially as described.

3. The combination, with the die and a support therefor, of carriage ways or guides, two parallel screws for actuating the carriage, and a carriage fitted to the ways and provided with nuts or interiorly-threaded parts fitted to the screws, substantially as set forth.

4. In a machine for drawing rods, the combination, with a die, horizontal carriage-guides, and means, substantially as described, for actuating the carriage, of a support for upholding the drawn part of the rod in a horizontal position, and gripping-jaws on the carriage constructed to bear laterally on the rod while said rod lies upon its said support, substantially as described.

5. The combination, with a carriage having an interiorly-threaded part or nut provided with an open slot extending to the threaded passage, of an actuating-screw fitted to said nut, and a stationary support for the screw, constructed and arranged to pass through the slot in the movement of the carriage, substantially as described.

6. The combination, with the slotted and interiorly-threaded carriage and the actuating-screw, of a sleeve embracing a reduced part of the screw, and a standard supporting said sleeve from a stationary part of the machine, substantially as described.

7. The combination, with other parts of an operative machine for drawing rods, of two parallel screws for actuating the drawing-carriage, and a drawing-carriage composed of two interiorly-threaded nuts, a plate or part rigidly joining said nuts, and jaws mounted on said carriage for gripping the rod, substantially as described.

8. The combination, with the rigid parts of the carriage, and means, substantially as described, for actuating the carriage, of gripping-jaws pivoted thereto, right-and-left screws, arranged to bear on said jaws, a rotating shaft parallel with said screws, and connecting-gears whereby the screws are simultaneously and equally turned when the shaft is rotated, substantially as set forth.

9. The combination, with the central table, D, and lower side supports or ways for the carriage, of two screws, C C′, arranged over the ways, a carriage composed of nuts E′, and a junction-plate, E^3, and rod-gripping jaws, attached to the carriage in position to hold the rod while the latter rests on the table, substantially as described.

10. The combination, with the gripping-jaws, of vertically-adjustable jaw-plates, substantially as described.

11. The combination, with the gripping-jaws, of vertically-movable jaw-plates, vertical set-screws securing said plates to the jaws, and washers interposed between parts of the plates and the jaws, substantially as described.

12. The combination, with suitable supporting parts, A, of a plate, D *d′ d*, having its central part elevated, as shown, and a carriage constructed to fit said plate, and provided with gripping-jaws adapted to hold the rod while the latter rests on the said central elevated part, substantially as described.

13. The combination, with a rod-support, D, and die-supports A′, of a die-block, B, having a die, B′, and a removable liner, B^2, substantially as described.

14. The combination, with uprights A′, provided with shoulders or flanges *a′*, of a plate, a^2, secured to the uprights, and clamping-screws *b*, substantially as described.

15. In combination with the screws C C′ and their bearings c^5, the fixedly-attached driving-pinions *c c*, provided with interiorly-recessed annular flanges c^7, and washers interposed between the pinions and the bearings c^5, and within the flanges c^7, substantially as described.

16. The combination, with a table or similar support for the drawn rod, of a reciprocating

carriage carrying rod-gripping devices, and constructed to afford a through-passage for the rod, whereby the carriage may return over the drawn rod, substantially as described.

17. The combination, with the table and carriage having a through-passage for the drawn rod, of devices for actuating the jaws by engagement with their outer portions, substantially as described, whereby the space between the jaws is left unobstructed, as set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WINSLOW ALLDERDICE.

Witnesses:
M. E. DAYTON,
OLIVER E. PAGIN.