

No. 712,608.

Patented Nov. 4, 1902.

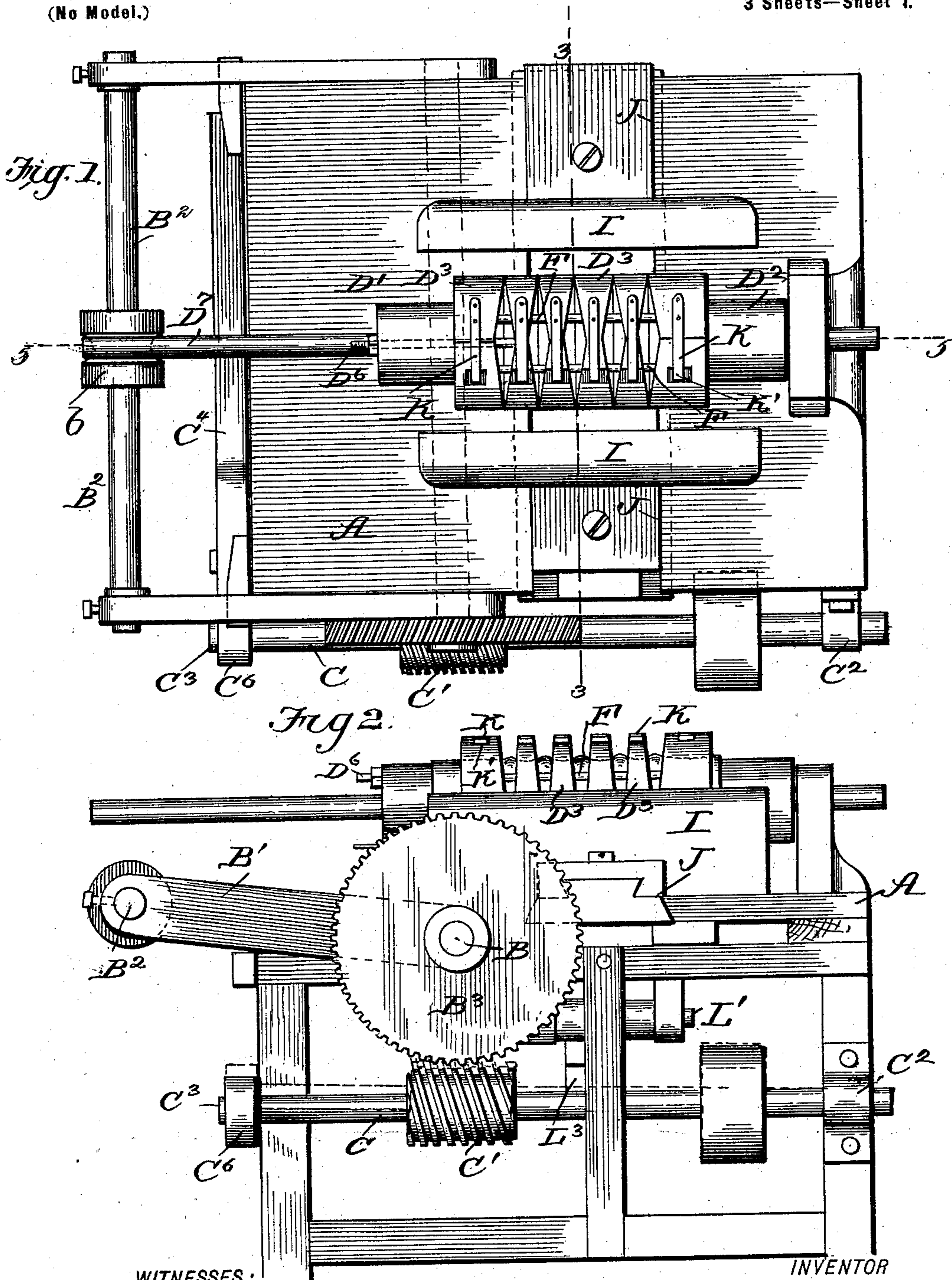
E. H. SMITH.

MACHINE FOR BENDING PIPE ELBOWS.

(Application filed Nov. 26, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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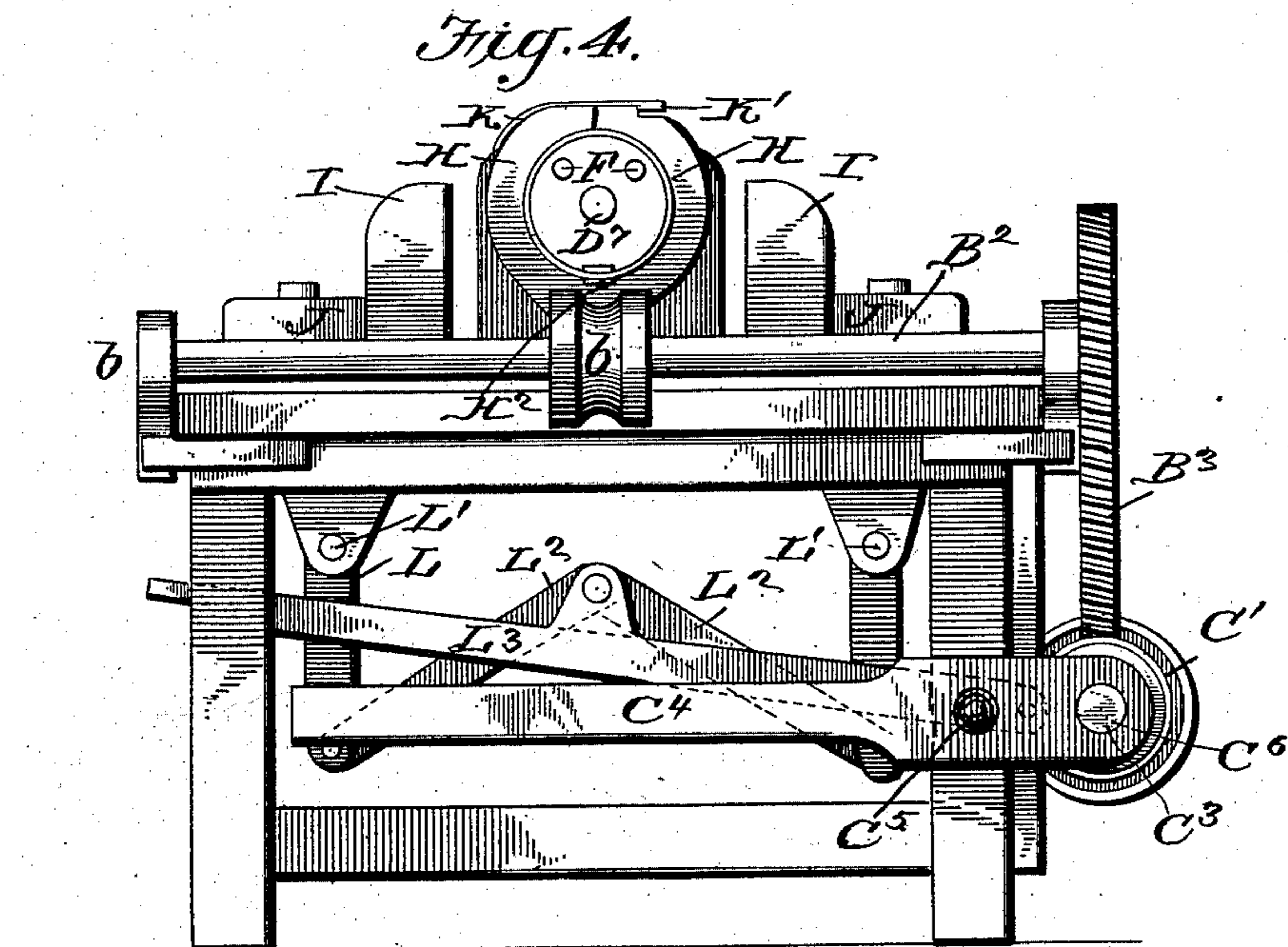
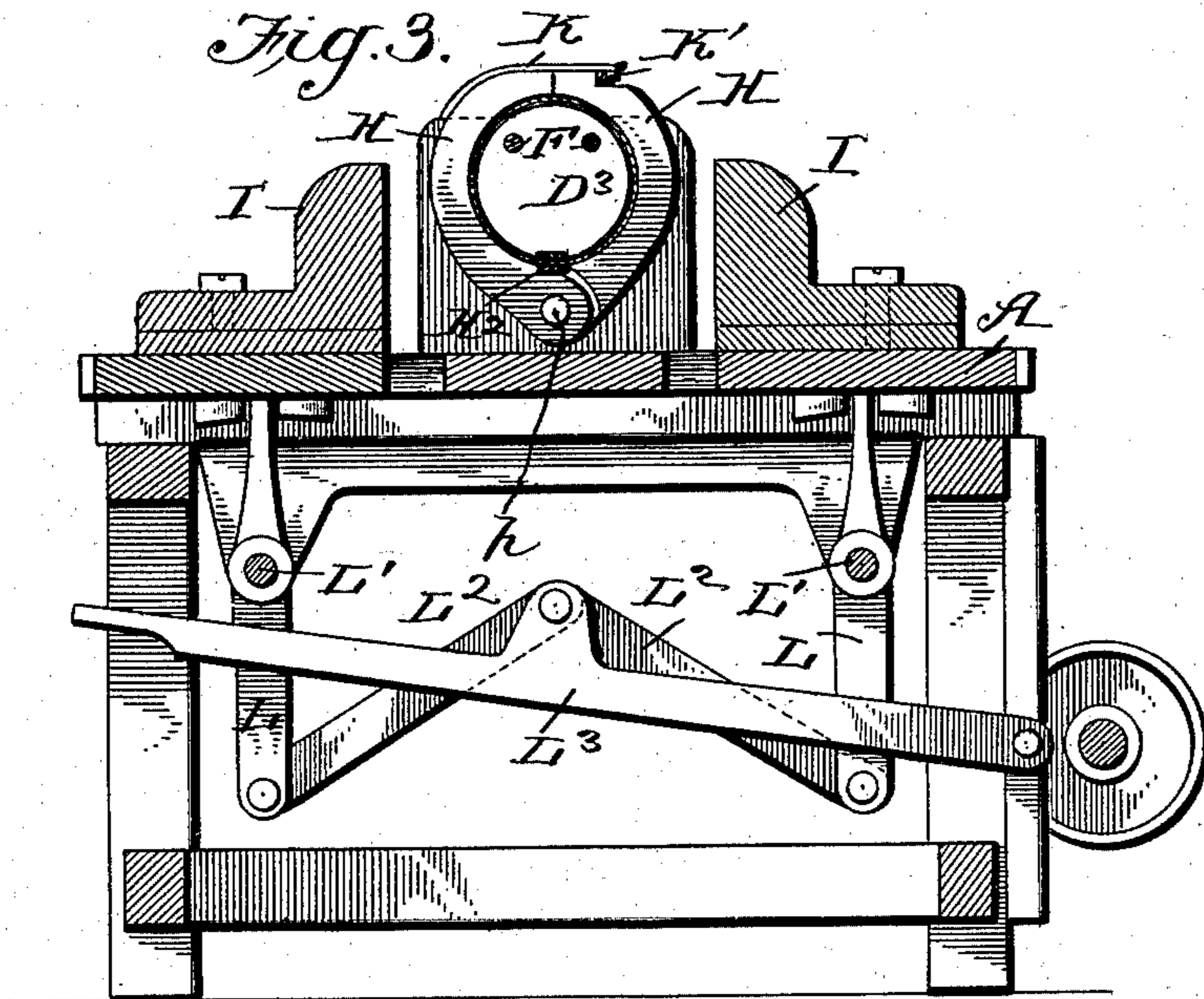
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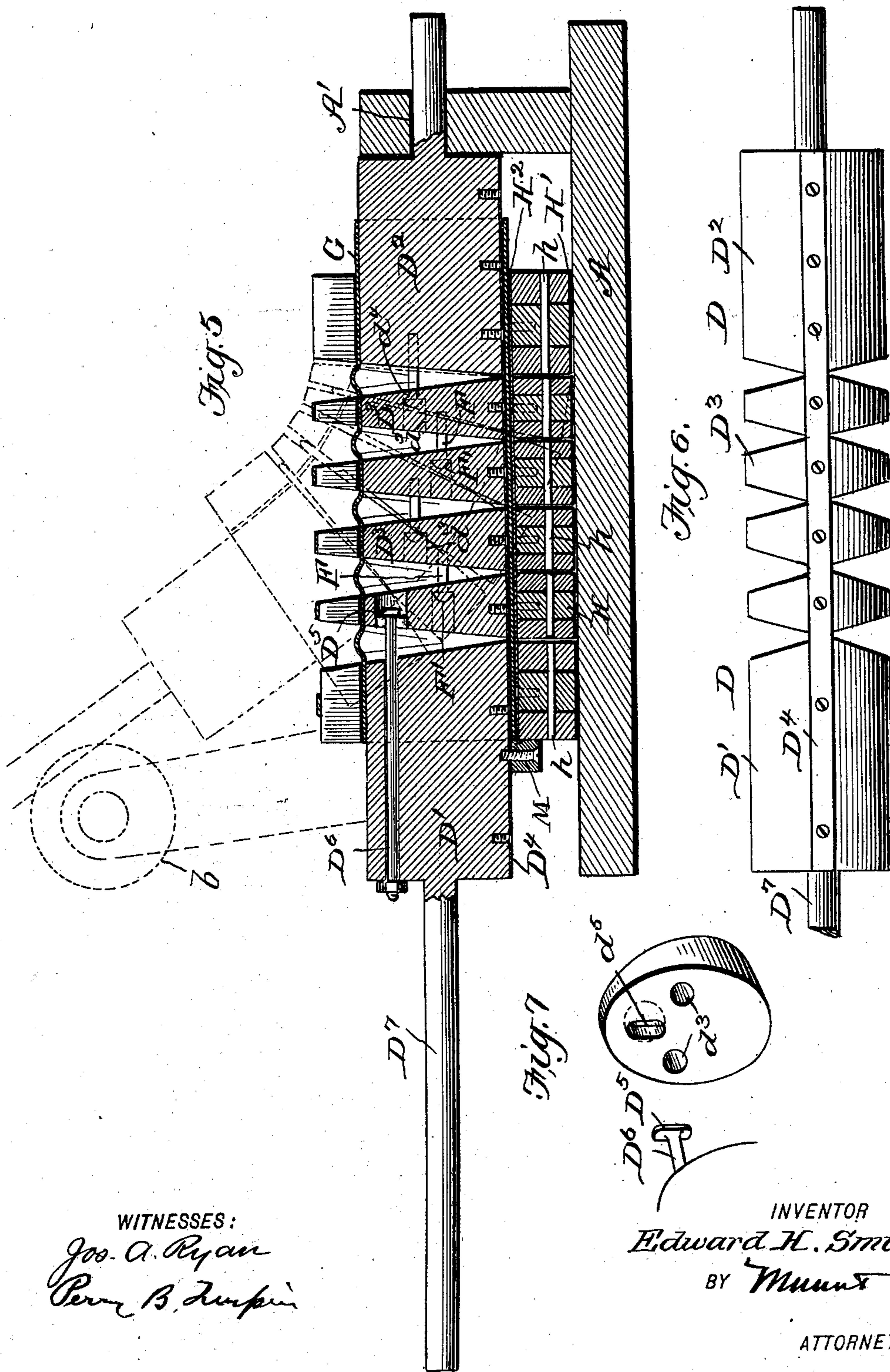
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UNITED STATES PATENT OFFICE.

EDWARD HERBERT SMITH, OF MOUNT VERNON, OHIO, ASSIGNOR TO DICK-ELMAN-BOWERS MANUFACTURING COMPANY, OF FOREST, OHIO, A CO-PARTNERSHIP.

MACHINE FOR BENDING PIPE-ELBOWS.

SPECIFICATION forming part of Letters Patent No. 712,608, dated November 4, 1902.

Application filed November 26, 1901. Serial No. 83,752. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HERBERT SMITH, a citizen of the United States, and a resident of Mount Vernon, in the county of Knox and State of Ohio, have made certain new and useful Improvements in Machines for Bending Pipe-Elbows, of which the following is a specification.

My invention is an improvement in machines for bending pipe-elbows; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a top plan view of my machine. Fig. 2 is a side elevation thereof. Fig. 3 is a cross-section on about line 3 3 of Fig. 1. Fig. 4 is an end elevation of the machine. Fig. 5 is a longitudinal section on about line 5 5 of Fig. 1, parts being omitted. Fig. 6 is a detail bottom plan view of the sectional mandrel, and Fig. 7 is a detail perspective view showing the construction for connecting the outer section of the mandrel with the tilting head thereof.

In carrying out my invention I provide a suitable framing supporting a top plate A, on which is mounted the supports for the mandrel and the opposite slides, which carry the jaws constituting the compressing device. A shaft B extends transversely of the machine below the top A and has fixed to it the arms B' of the tilting-bail, the cross-bar B² of said bail being arranged to engage the stem or shank of the mandrel to tilt the mandrel in bending the crimps in the pipe. To the shaft B is secured a worm-wheel B³, and a shaft C, carrying a worm C', is arranged to be thrown into and out of mesh with the worm-wheel B³, as will be understood from dotted lines in Fig. 2. To this end the shaft C is loosely mounted at one end in a bearing C², so its other end C³ can be raised and lowered to set the worm into and out of mesh with the worm-wheel B³, a treadle C⁴ being pivoted at C⁵ and connected at C⁶ with the end C³ of the shaft C, so it can be readily operated to throw the worm C' into mesh with the wheel B³, the worm being arranged to drop by gravity out of mesh with the wheel B³ when the treadle C⁴ is released.

By this construction the worm can be readily thrown into mesh with the wheel B³ to cause the bail to rise to the position indicated in dotted lines *b* in Fig. 5 to bend the mandrel and stovepipe-cylinder into the elbow form desired. Manifestly the shaft C may be driven in any suitable manner and will not affect the position of the bail except when adjusted to set the worm into mesh with the wheel B³, as before described.

The mandrel D is made in sections circular in cross-section and tapering toward their upper edges, as shown in Fig. 5, and with the tilting head D' and the fixed tailpiece D² on opposite sides of the tapered sections D³, before referred to. The several sections D', D², and D³ are connected along the lower side of the mandrel by a flexible strip D⁴, preferably of spring metal, so it will aid in returning the mandrel to its normal position (shown in full lines in Fig. 5) when the completed elbow has been removed from the machine. The tapered sections D³ of the mandrel are provided in their sides facing toward the head D' with sockets *d*³, from which extend smaller holes *d*⁴ to the opposite face of the tapered sections, and bracing and guide studs F are provided with heads F', fitting in the sockets *d*³, with the studs extending through the openings *d*⁴ and secured to the next section D³, as shown in Fig. 5. By this means the tapered sections brace each other against torsional twist, as will be understood from Fig. 5. The tapered section D³ lying next to the head D' is provided near its upper edge with a slotted or elongated opening *d*⁵, (see Fig. 7,) through which a similarly-shaped head D⁶ on a bolt D⁶ projects, the bolt D⁶ being extended through the head D', given a quarter-turn, and secured, as shown in Fig. 5. It will be understood from Fig. 5 that the tailpiece D² is held in a suitable support A', mounted on the top A, and that the opposite end of the mandrel being provided with the stem or shank can be raised to the dotted-line position by the operation of the bail for the purpose of bending the pipe to the elbow form, as desired. It will be noticed that the stem D', which projects from the head D', is en-

gaged by a roller *b* on the cross-bar B^2 of the tilting-bail in securing the tilting of the mandrel, as before described.

When the pipe *G* has been slipped on the mandrel to the position shown in Fig. 5, the clasp-sections are then slipped on over the pipe to the position shown in the said figure. These clasp-sections are formed in pairs, the opposite sections of each pair being pivoted together at their lower ends at *h* and the sections *H* curving around the pipe, as shown in Figs. 3 and 4, and the several sections being connected at their lower ends by a flexible strip or connection H^2 , as shown in Fig. 5. When the pipe is fitted on the mandrel and the clasp-sections applied thereon, the clasps are operated on to close them and to compress the pipe by the compressing devices shown in Figs. 1, 2, 3, and 4 and consisting of the jaws *I I*, operating on opposite sides of the clasps and movable in guides *J* toward and from the clasps, so they will force the clasp-sections tightly together to the position shown in Figs. 3 and 4 and will so compress the pipe to the desired cylindrical form. Each clasp is provided with a latch, which may be a spring *K*, secured to one section and adapted at K' to engage the other section, as shown in Figs. 3 and 4. To move the jaws positively against the clasp, I provide a lever *L* for each jaw, said levers being pivoted at L' and connected by links L^2 with a treadle L^3 , which may be operated to force the jaws toward and from the clasps, as will be understood from the drawings.

In the operation of the machine before described it will be noticed the pipe will be fitted on the mandrel, the clasps then slipped on over the pipe, the jaws be operated to compress the clasps and pipe, and the proper treadle operated to set the worm into gear with its worm-wheel to cause the bail to swing upward and tilt the mandrel to bend the pipe-elbow, as desired. In thus bending the pipe-elbow the preliminary crimps will be forced up between the sections of the clasp and will be pressed into the form of flat ribs or flanges projecting from the surface of the elbow.

The mandrel may be provided near its outer end with a block *M*, detachably connected with the mandrel by means of a screw and arranged to lock the clasps on the mandrel when such clasps have been slipped to proper position, as shown. It will be noticed that this block also overlaps the outer end of the pipe and holds the same from any longitudinal movement.

It will be noticed in Fig. 5 that the tilting head D' and the fixed tailpiece D^2 are secured in connection with the tapered sections D^3 by screws, so the tapered sections may be detached when desired and sets of fewer or more sections substituted to suit the number of crimps to be produced in the elbow.

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

1. A machine for bending pipe-elbows comprising the framing, the sectional mandrel adapted to receive the pipe the clasp-sections adapted to fit over the pipe, flexible connections between the sections of the mandrel, flexible connections between the sections of the clasps, latches for securing the clasp-sections upon the pipe, the compressing devices for operating upon the clasps, the treadle and intermediate levers for operating the compressing devices, the projecting stem or shank at the tilting end of the mandrel, a support for the other end of the mandrel, the tilting-bail having a cross-bar arranged to engage the stem of the mandrel, a worm-wheel in connection with said bail and a driving-worm movable into and out of mesh with the worm-wheel and means whereby the said worm may be moved into mesh with its worm-wheel substantially as set forth.

2. In a machine for bending pipe-elbows a mandrel having sections circular in cross-section and tapering toward their upper edges combined with bracing and guide studs held at one end to one of said sections and operating at their other ends in sockets in the adjacent sections, and flexible connections between the mandrel-sections substantially as set forth.

3. The combination in a machine for bending pipe-elbows of a sectional mandrel having a stem or shank at its tilting end, a bail having its cross-bar arranged to operate upon said stem or shank and means whereby said bail may be thrown into and out of gear with a moving part of the machine substantially as set forth.

4. A machine for bending pipe-elbows comprising a mandrel composed of a series of connected sections fitted side by side, and a clasp composed of a series of pairs of sections arranged side by side with the sections of each pair hinged substantially as set forth.

5. The combination in a machine for bending pipe-elbows of a sectional mandrel to operate within the pipe during the bending of the latter, a series of sectional clasps to fit over the pipe on said mandrel, and means for compressing such clasp substantially as set forth.

6. A machine for bending pipe-elbows comprising a mandrel to fit within the pipe and composed of sections fitting side by side and standing at a right angle to the axis of the mandrel, a sectional clasp composed of pairs of sections, the sections of the pairs being hinged together at one end, and latches for securing the clasp-sections at their other ends substantially as set forth.

7. A machine for bending pipe-elbows consisting of the sectional mandrel, the clasps to fit on the pipe fitted over said mandrel and corresponding to the sections of said mandrel, the opposite jaws for compressing the clasps, the levers engaged with said jaws, the links connected with said levers, and the treadle connected with said links whereby to operate

the compressing-jaws substantially as set forth.

8. A machine for bending pipe-elbows provided with a mandrel composed of sections 5 circular on their outer faces in cross-section and tapering toward one edge, and a flexible connection uniting the sections at the opposite edge, and means for securing the elbow upon said mandrel substantially as set forth.

10 9. The combination in a machine for bending pipe-elbows of the sectional mandrel, the sectional clasp fitting over said mandrel and arranged with its sections and pairs hinged at one edge and provided with latches, the 5 sectional mandrel and sectional clasp being arranged and adapted to be flexed jointly in bending the pipe into elbow form substantially as set forth.

10 10. In a machine substantially as described the combination with means for supporting the pipe which is to be bent, of the tilting devices including a rocking frame and means whereby said rocking frame may be thrown into and out of gear with the moving part of 25 the machine substantially as set forth.

11. In a machine for bending pipe-elbows the combination of the devices for supporting the pipe having a projecting part for engagement by the tilting devices, the rocking frame 30 arranged to engage said part, a worm-wheel in connection with the rocking frame, and a worm movable into and out of mesh with the worm-wheel substantially as set forth.

12. In a machine for bending pipe-elbows 35 the combination of the mandrel composed of sections tapered toward one edge and having a flexible connection at the opposite edge, and the clasps fitting over said mandrel and composed of a series of pairs of jointed sections 40 and a flexible connection between said pairs, substantially as set forth.

13. In a machine for bending pipe-elbows the combination of the mandrel composed of sections and provided with a projecting stem 45 or shank, the rocking bail having a cross-bar arranged to engage said shank and means whereby said bail can be operated at will to elevate the shank and so bend the mandrel substantially as set forth.

50 14. In a machine substantially as described the combination of the mandrel composed of

sections and having a projecting stem or shank, the bail having a cross-bar arranged to engage said shank, a worm-wheel in connection with said bail, and the worm movable into and out of mesh with the worm-wheel substantially as set forth. 55

15. In a machine for bending pipe-elbows the combination of the mandrel composed of sections, the clasp composed of a series of 60 pairs of sections provided at their free ends with latch devices and hinged together at their opposite ends, flexible connections between the sections of the mandrel, flexible connections between the pairs of sections of 65 the clasp, means for compressing the clasp laterally, and means whereby the mandrel and clasp may be bent to bend the pipe substantially as set forth.

16. A machine for bending pipe-elbows 70 composed of a mandrel consisting of sections fitting side by side and standing at a right angle to its axis and adapted to fit within the pipe to be bent, and a clasp composed of a series of sections fitting over the sectional 75 mandrel and adapted to be bent with said mandrel in bending the pipe into elbow form.

17. A machine for bending pipe-elbows comprising the sectional mandrel receiving the pipe and adapted to be flexed therein in 80 bending the pipe into elbow form, the clasp-sections arranged to fit over the pipe and corresponding to the sections of the mandrel, and laterally-movable compressing devices operating upon the clasp-sections to compress 85 the same upon the pipe, substantially as set forth.

18. A machine for bending pipe-elbows comprising a longitudinally-flexible mandrel arranged to fit within the pipe and to be bent 90 therewith into elbow form and a clasp adapted to fit over the pipe and the mandrel therein and to be bent therewith into elbow form, such clasp having sections between which the crimps of the elbow may be pressed into 95 the form of flat ribs or flanges substantially as set forth.

EDWARD HERBERT SMITH.

Witnesses:

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