(No Model.)

C. VAN HAAGEN.

MACHINE FOR FORGING DRILLS OR REAMERS.

No. 437,841. Patented Oct. 7, 1890.

FIG. 1.

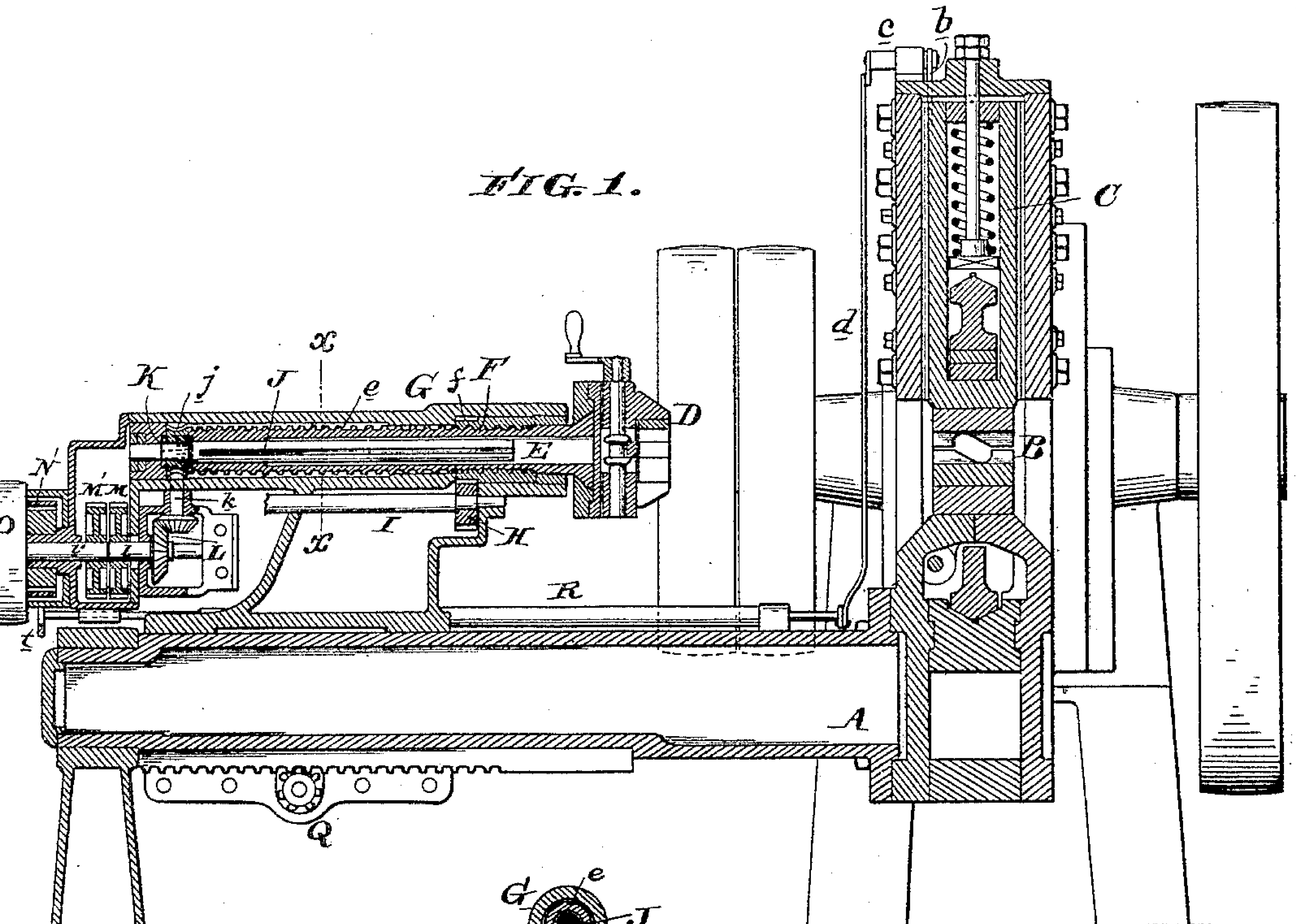
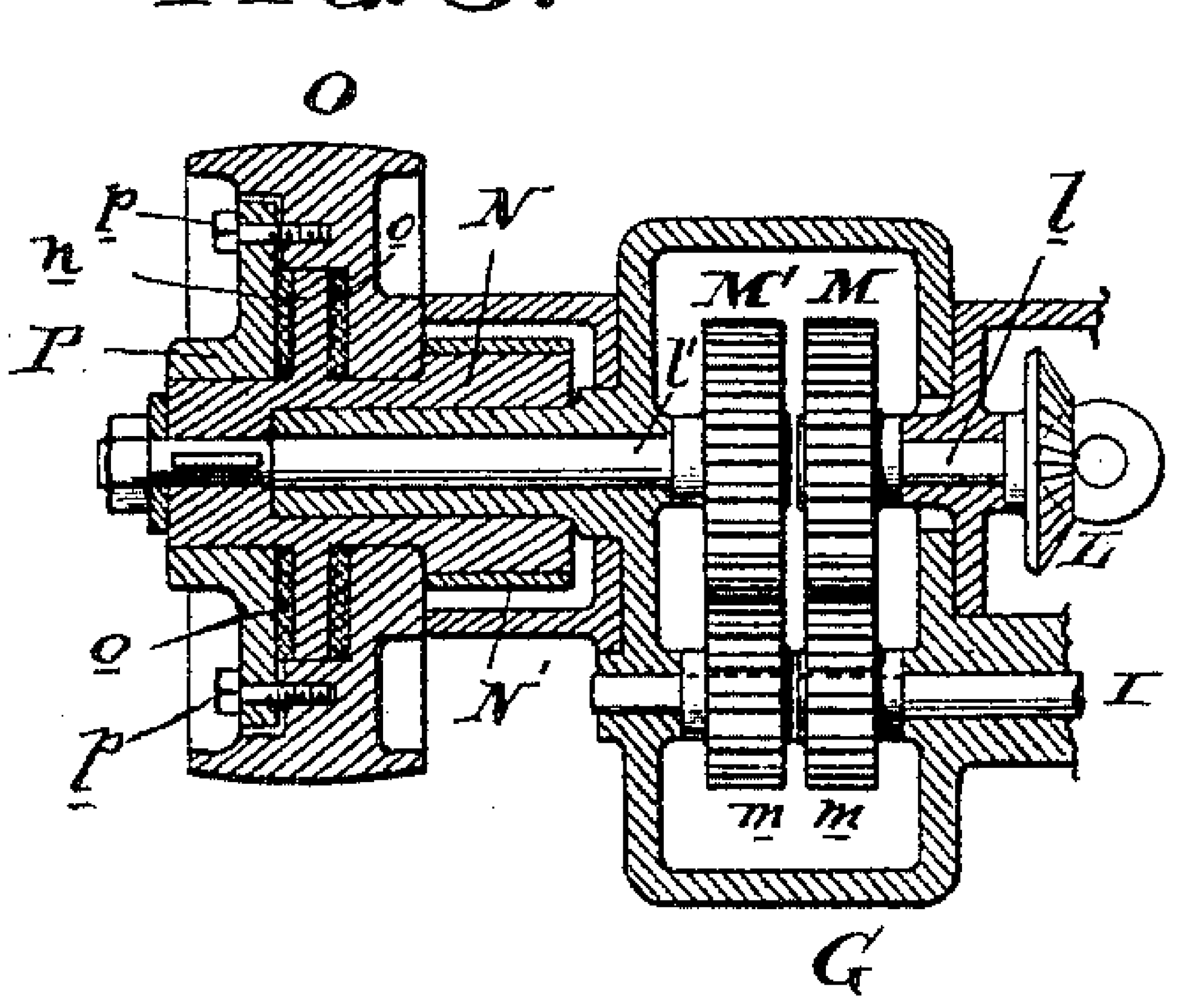
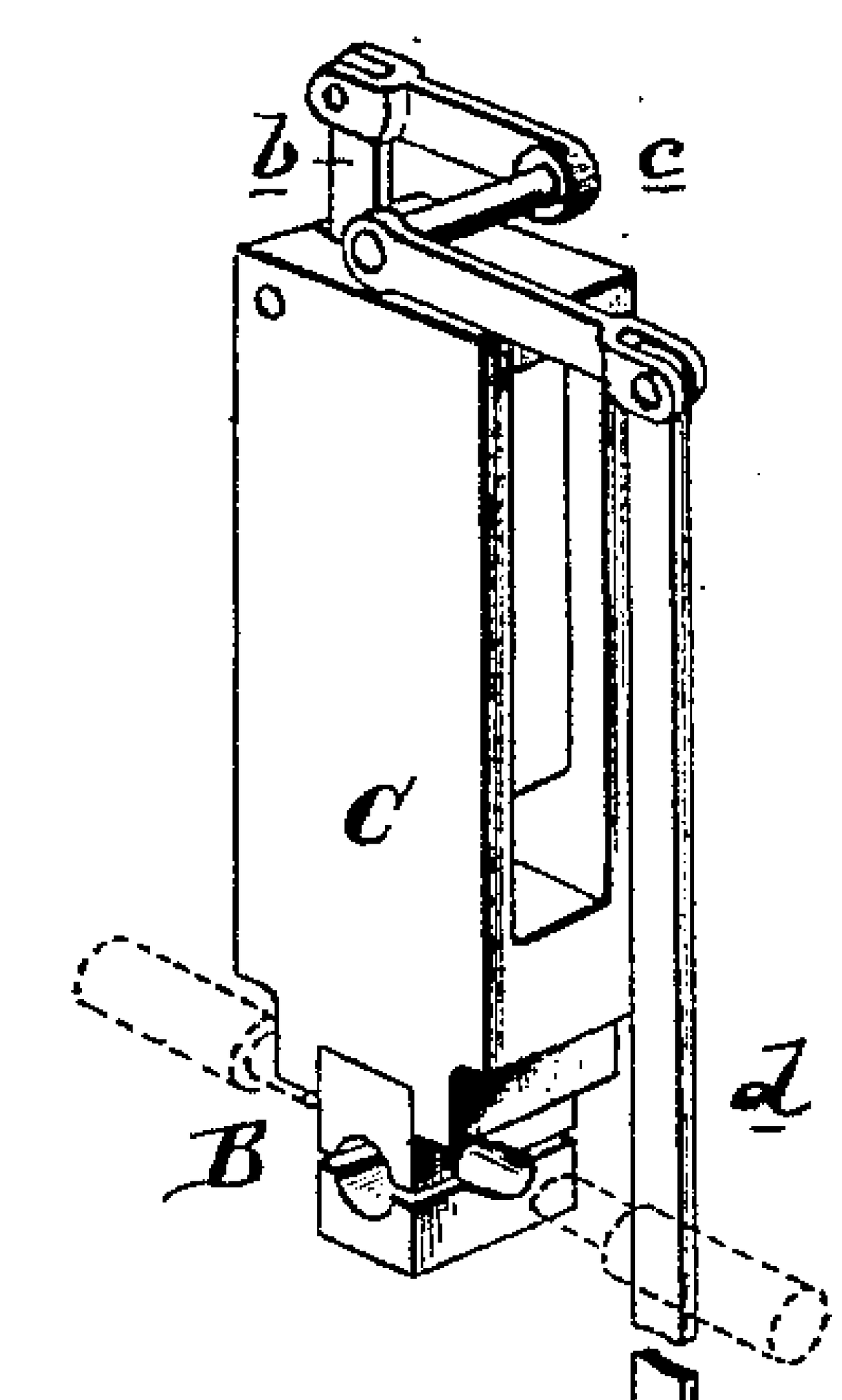


FIG. 4.

FIG. 3.





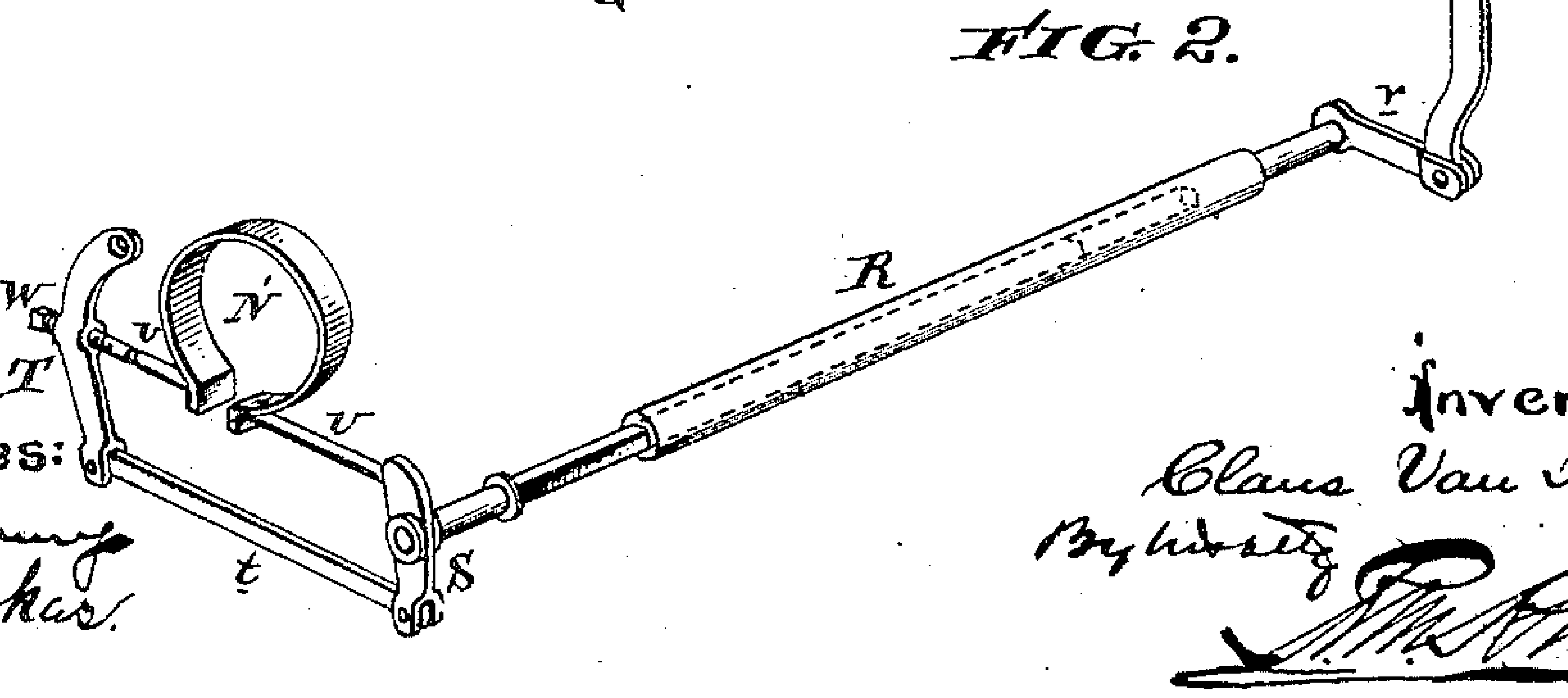


FIG. 2.

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By his Attorney

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UNITED STATES PATENT OFFICE.

CLAUS VAN HAAGEN, OF CHESTER, PENNSYLVANIA, ASSIGNOR TO THE CHESTER TWIST DRILL AND TOOL COMPANY, OF SAME PLACE.

MACHINE FOR FORGING DRILLS OR REAMERS.

SPECIFICATION forming part of Letters Patent No. 437,841, dated October 7, 1890.

Application filed January 28, 1890. Serial No. 338,373. (No model.)

To all whom it may concern:

Be it known that I, CLAUS VAN HAAGEN, of Chester, in the county of Delaware and State of Pennsylvania, have invented an Improvement in Machines for Forging Drills and Reamers, of which the following is a specification.

My invention has reference to machines for the manufacture of drills and reamers; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

More particularly my invention relates to an improvement upon the machine set out in Letters Patent No. 296,254, granted to me on April 1, 1884. In the said patent the drill-rod was fed forward between the forging-dies by suitable mechanism which was operated by hand, and likewise the rotation imparted to the chuck for insuring the groove being made spiral was also performed by hand, the said movements being imparted from the same hand-wheel and having a previously-determined relation to each other, so that for a given forward movement of the chuck a corresponding rotary movement was also imparted thereto. The objection to this method of operation was that it required the constant attendance of a skilled operator at the hand-wheel and necessitated considerable care to avoid irregular feeding of the drill-rod through the dies. If the feeding was irregular the duty upon the dies would also be irregular and with liability to produce defective work and at the same time produce excessive wear and irregular strain upon the hammer-dies. As the hammer-dies strike the drill-rod at a very high rate, imparting a large number of strokes per minute, it will be apparent that the feeding-movement should also be as many times repeated per minute, and it is clear that automatic mechanism controlled by the movement of the dies or other moving part of the machine would be far more reliable than hand manipulation.

The object of my invention is to overcome the necessity of employing hand labor for this feeding of the drill-rod through the dies, and instead to employ mechanism automatically operated and controlled by the movement of the dies or their operating parts, which shall act upon the chuck holding the drill-rod and impart to it the necessary forward and rotary movement to insure the proper feeding of the drill-rod for any given number of strokes of the dies.

The mechanism for carrying out my invention will be better understood by an examination of the accompanying drawings, in which—

Figure 1 is a sectional elevation through my improved drill-forging machine. Fig. 2 is a perspective view showing the mechanism between the dies and the brake of the feeding mechanism. Fig. 3 is a sectional elevation of the left-hand portion of Fig. 1, but taken on a plane through the shafts I and *l* of that figure; and Fig. 4 is a cross-section on line *x x* of part of Fig. 1.

It will not be necessary for me to describe the details of the forging-machine beyond that which is necessary for disclosing my present invention, as the details of the machine are fully set out in my patent above referred to.

B represents the dies, which may be formed of any suitable construction and operated in any suitable manner, so as to be relatively reciprocated to and from each other while forging the drill. The upper die is secured to a vertically-reciprocating frame C, which is operated by eccentrics and cams, as fully disclosed in my aforesaid patent.

A is the main frame of the machine.

D is a chuck for holding the rod to be forged into a drill or reamer, and said chuck is carried indirectly by a frame G, which slides upon the main frame A, and made adjustably to or from the dies B by means of the pinion and rack Q. The chuck D is secured to a hollow shaft J, which is provided with an external screw-thread *e*, working through a nut or sleeve D, having gear-teeth *f*, which mesh with the pinion H upon the shaft I. These several parts are supported by the frame G. By rotating the shaft I the nut F is rotated, and this feeds the chuck D forward or backward with respect to the dies, according as to whether the shaft I is rotated in one direction or the other. The tube E is connected with the shaft J by means of a

spline or feather, or other suitable device, as set out in my patent aforesaid, the connection being such that when the shaft is rotated the tube E and its chuck D are rotated also, but at the same time are permitted to have an independent longitudinal movement due to the action of the revolving nut F. This spline connection is clearly shown in Fig. 4.

The shaft J is provided with a worm-wheel *j*, with which meshes a worm shown in dotted lines at K, and secured to a shaft *k*. This shaft *k* is connected with a short shaft *l* by means of bevel-gearing L. Arranged in line with this shaft *l* is a separate shaft *l'*, and these shafts are provided with spur-wheels M M', respectively, and said spur-wheels are connected by means of the pinions *m* and the shaft I. It will thus be seen that if the shaft *l'* is rotated the shaft *l* will be rotated also and in the same direction, and by means of the bevel-wheels L and worm K will impart to the shaft J a corresponding rotation. Simultaneously with this rotation of the shaft J a rotation of the nut or sleeve F will be given by the pinion H and the shaft I, which latter is rotated through the mediation of the pinions *m*. This combined action induces the chuck D to be fed forward with respect to the dies, and simultaneously therewith to have imparted to it a given rotation corresponding to the spiral groove to be formed in the drill. By changing the diameter of the wheels M and *m* it is evident that with a given forward feeding of the chuck the rotation thereof may be increased or decreased for producing spiral grooves having different pitches. The shaft *l'* is secured to a sleeve N, having a flange *n*, upon which is clamped a driving-pulley O. The construction of this driving-pulley and its connection with the sleeve is best shown in Fig. 3, and consists, essentially, of two parts, one of which is journaled upon the sleeve and the other of which consists of a face-plate P, which is clamped by means of bolts *p* against a leather or other packing *o*, which is pressed against the face of the flange *n*. If desired, there may be an additional packing or friction ring *o* upon the opposite face of the flange *n*, as shown. It will thus be seen that any degree of friction desired may be obtained, so that the rotation of the driving-pulley O will create a tendency more or less to rotate the sleeve N.

The sleeve N is secured to the shaft *l'*, so that the tendency to rotate said sleeve is imparted to the shaft *l'* also. Encircling the sleeve is a friction-band N', which acts as a brake to arrest the said sleeve at given periods corresponding to the time when the dies are forging the drill-rod. This friction-band N' is operated by suitable mechanism connecting with the devices which operate the dies, or with any other portions of the machine having movements corresponding to the reciprocations of said dies.

In practice I prefer to connect the mechanism for operating the friction-band with the vertically-reciprocating portion C for moving the upper die B, and this mechanism is best shown in Fig. 2. It consists of a lever *c*, having one end connected to the frame C by a link *b*, and its other end connected to a telescopic shaft R by a crank *r* and a link *d*. The telescopic shaft R is provided with a cross-arm S, the lower end of which is connected by link *t* with the lower end of a pivoted arm T. Arranged between one end of the brake or friction band N' and the upper end of the arm S is a rod U, and between the other end of the friction-band and adjusting-screw W on the arm T is a second rod U. The screw W may be adjusted to compensate for any wear upon the friction-band. The parts T and S form levers of different orders, and by their connection through the link *t* are so operated by the rotation of the shaft R that they act upon the ends of the brake-band in opposite directions, so as to clamp or release the sleeeve for allowing intermittent rotation thereof.

The telescopic construction is employed so as to permit the frame G to be moved to or from the dies and with it the friction-brake mechanism and yet at all times maintain an operative connection between the parts C and S.

If the friction-band were not employed, then the constant rotation of the band-wheel O would cause a tendency to a constant forward and spiral movement to the drill-rod, and this would necessitate the intermittent arresting of the motion by the action of the dies upon the drill-rod, which would be unreliable and apt to produce poor work; but by my construction the mechanism which acts to forge the drill simultaneously with the gripping of the drill-rod arrests the rotation of the sleeve N, allowing the pulley-wheel O to slip through its friction-connection with the flange *n*. It will thus be seen that for every one of the reciprocations of the frame C and its die there will be a corresponding gripping and releasing of the sleeve N by the brake-band N', thus insuring a very large number of intermittent feeding movements of the drill-rod per minute. It is clear that there are many ways of modifying the details of the mechanism for accomplishing this object; hence I do not limit myself to the specific constructions herein set out, my invention comprehending in a machine of this class mechanism, broadly considered, connecting between the feeding mechanism for the drill-rod and the moving parts of the machine for performing the forging operation, whereby the drill-rod is fed forward intermittently with a number of movements corresponding to the movement of the dies, so that when the dies are away from the drill-rod the feeding action thereto is imparted.

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

1. In a machine for forging drills or ream-

ers, the combination of one or more reciprocating forging-dies, a chuck or holder for the drill-rod adapted to be moved to or from the said dies, power devices for feeding said chuck to or from the said dies, and intermediate mechanism between the reciprocating die and the power mechanism for the chuck, whereby the movement of the chuck is controlled by the movement of the dies or other operating parts.

2. In a machine for forging drills or reamers, the combination of one or more reciprocating dies, a chuck or holder for the drill or reamer rod adapted to be moved to or from the dies, feeding devices for said chuck to move it to or from the dies, power devices to operate the feeding devices, and a friction power-transmitting device arranged between the power devices and feeding devices for the chuck.

3. In a machine for forging drills or reamers, the combination of one or more reciprocating dies, a chuck or holder for the drill or reamer rod adapted to be moved to or from the dies, feeding devices for said chuck to move it to or from the dies, power devices to operate feeding devices, friction-transmitting devices between the power and feeding devices for the chuck, a brake to intermittently arrest the movement of the feeding devices, and connecting mechanism between the dies and the brake, whereby the latter is intermittently applied for each action of the dies in forging the drill or reamer.

4. In a machine for forging drills or reamers, the combination of one or more reciprocating dies, a chuck adapted to be moved to or from the dies and at the same time rotated, feeding devices for feeding the chuck to or from the dies and also rotating the same, a power-wheel for imparting motion to the feeding devices, a friction device arranged between the power-wheel and feeding devices, and a brake adapted to arrest the movement of the feeding devices operated by the dies or their connections.

5. In a machine for forging drills or reamers, the combination of one or more reciprocating dies, a chuck adapted to be moved to or from the dies and at the same time rotated, feeding devices for feeding the chuck to or from the dies and also rotating the same, a power-wheel for imparting motion to the feeding devices, a brake adapted to arrest the movement of the feeding devices operated by the dies or their connections consisting of a sleeve secured to the shaft of the feeding mechanism, an encircling friction-band for said sleeve, a rock-shaft, and connections for clamping or releasing the said friction-band, and lever-connections between the rock-shaft and moving dies or their connections.

6. The combination, in a machine for forging drills or reamers, of one or more of the reciprocating dies with a chuck movable to and from said dies, devices for moving said chuck to or from said dies, a constantly-rotating power-wheel, a friction device interposed between the power-wheel and feeding devices for the chuck, and means controlled by the movement of the dies or their operating parts for intermittently arresting the movement of the feeding devices without interfering with the rotation of the power-wheel.

In testimony of which invention I hereunto set my hand.

CLAUS VAN HAAGEN.

Witnesses:
ERNEST HOWARD HUNTER,
S. T. YERKES.