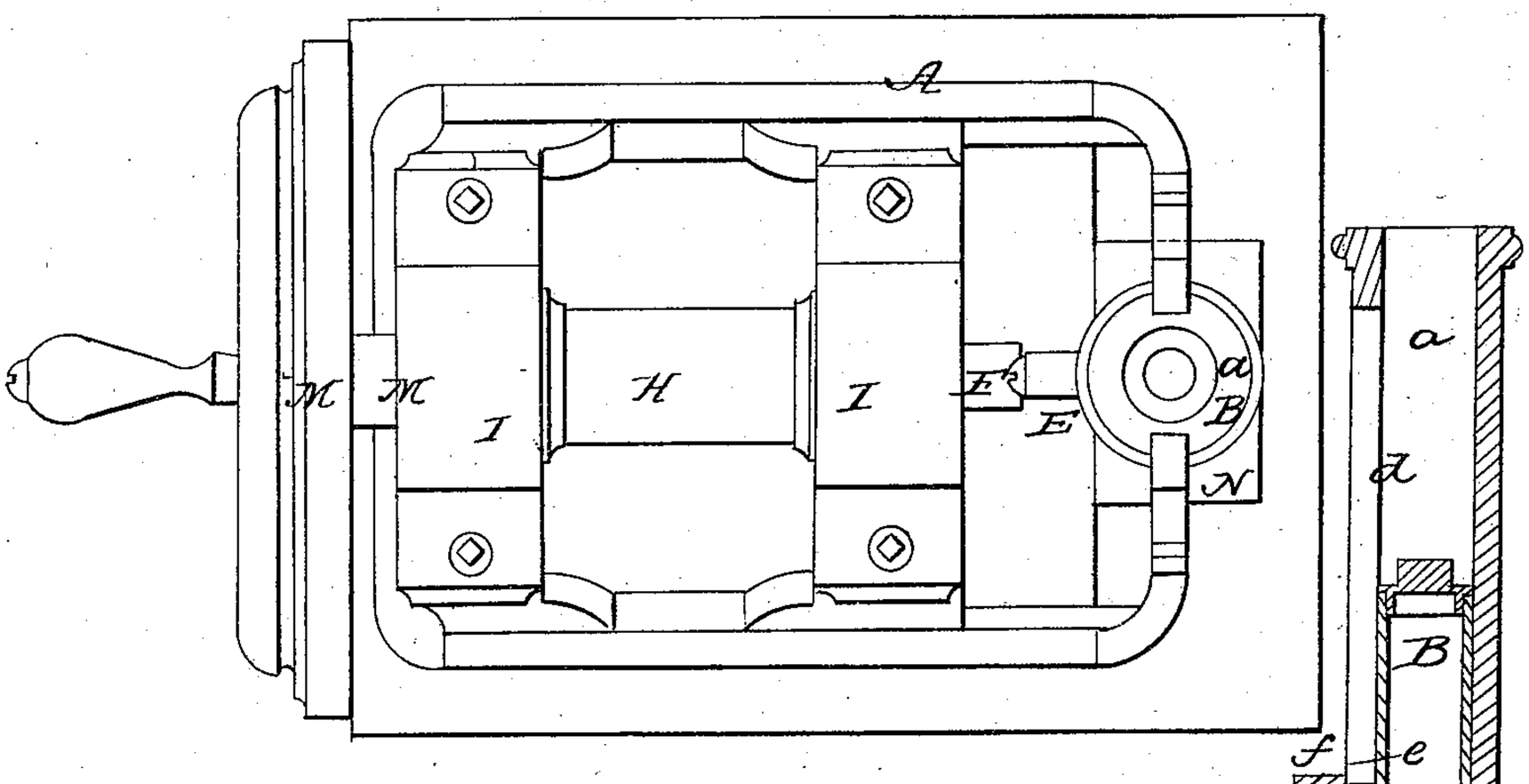
2 Sheets—Sheet 1.

B. HOTCHKISS.

Trip Hammer.

No. 24,428. Patented June 14, 1859.

Fig. 1



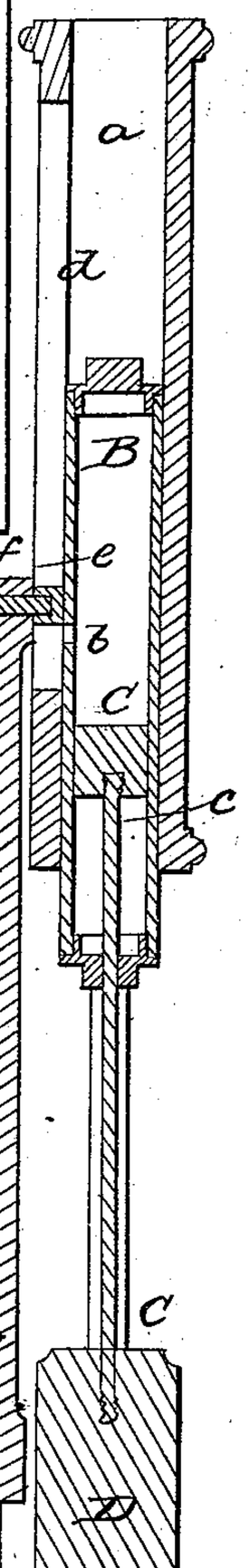
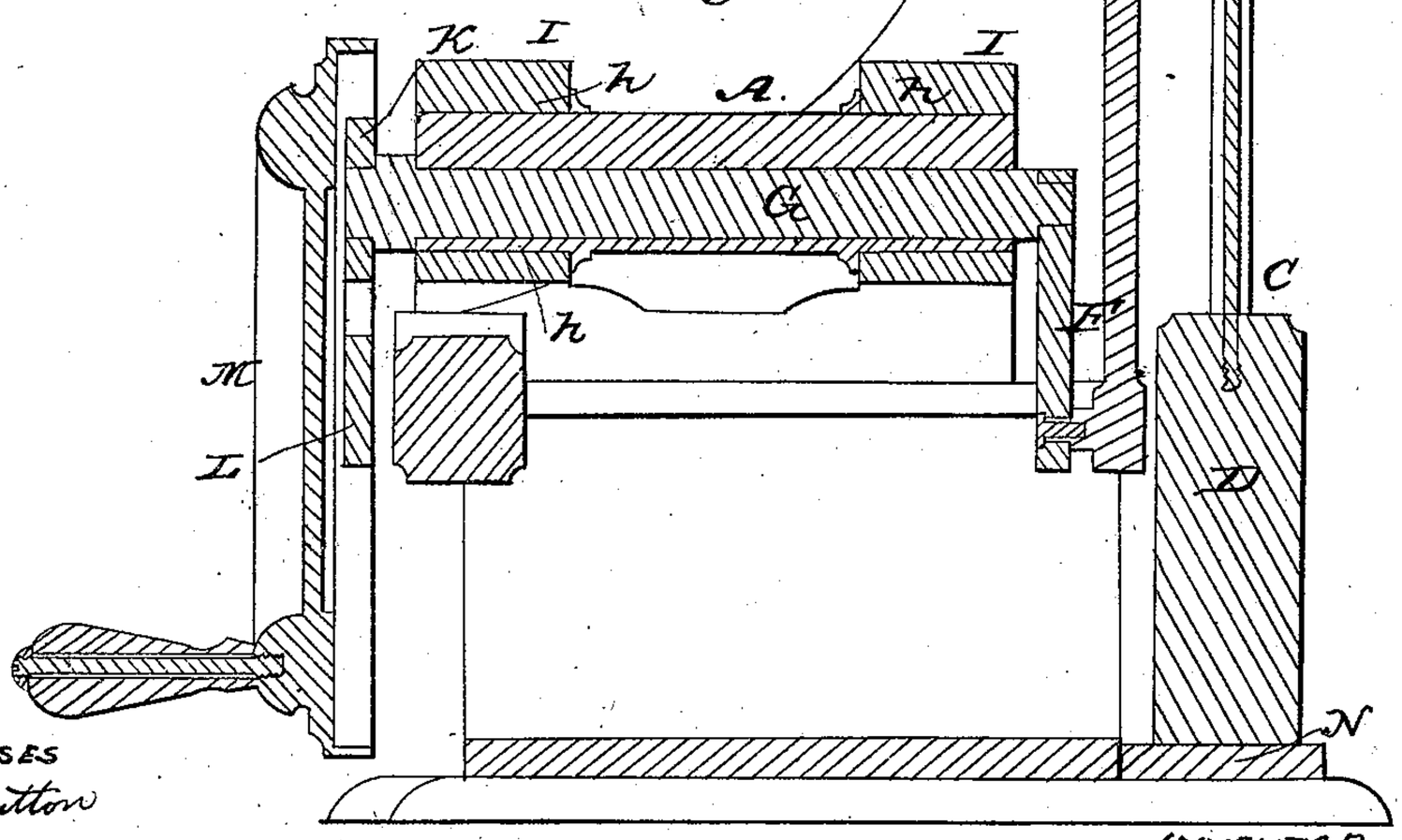


Fig. 3



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2 Sheets—Sheet 2.

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Trip Hammer.

No. 24,428. Patented June 14, 1859.

Fig. 2

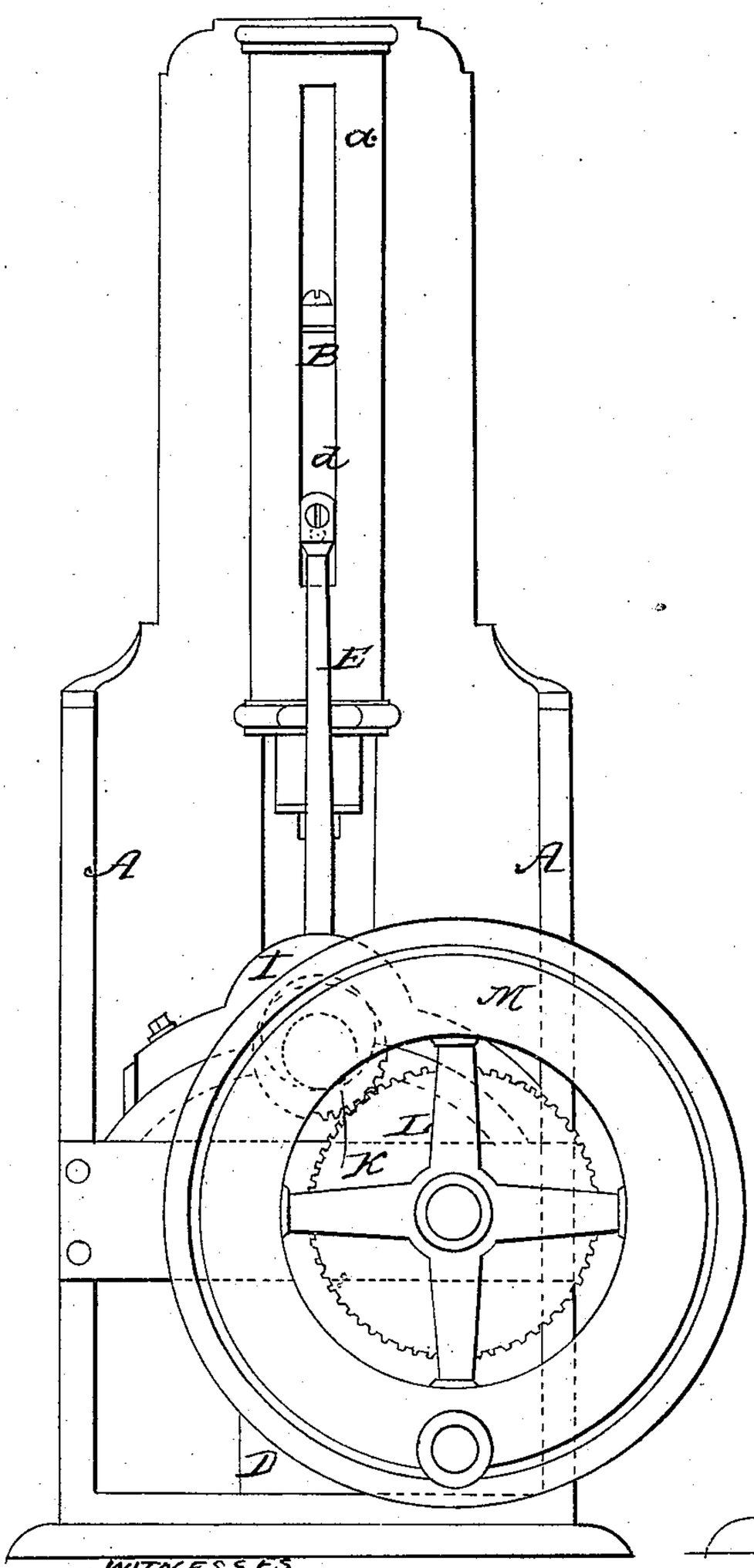
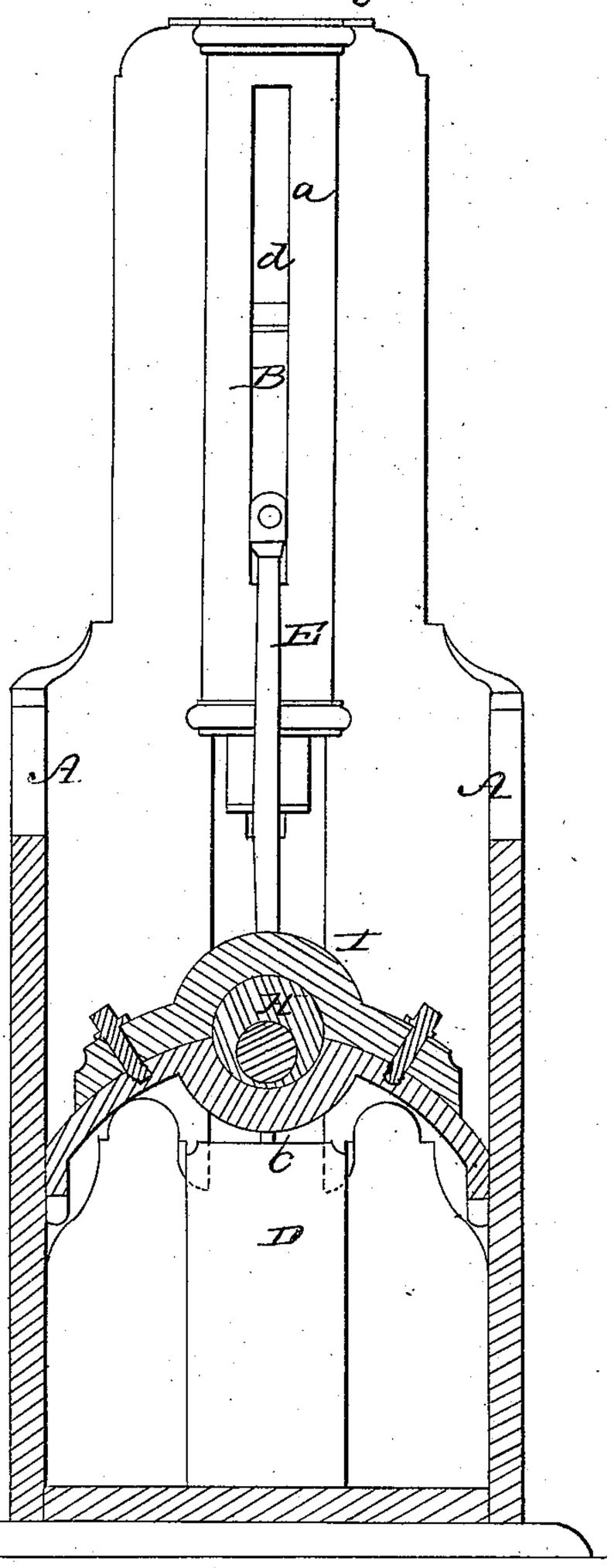


Fig. 4



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UNITED STATES PATENT OFFICE.

BENNET HOTCHKISS, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO HIMSELF AND F. S. COLLINS, OF SAME PLACE.

TRIP-HAMMER.

Specification forming part of Letters Patent No. 24,428, dated June 14, 1859; Reissued November 6, 1866, No. 2,389.

To all whom it may concern:

Be it known that I, BENNET HOTCHKISS, of the city and county of New Haven and State of Connecticut, have invented a new and useful or Improved Atmospheric Trip-Hammer; and I do hereby declare that the same is fully described and represented in the following specification and the accompanying drawings, of which—

Figure 1, is a top view. Fig. 2, a rear elevation, and Fig. 3, a vertical, central and longitudinal section of the same. Fig. 4, is a transverse section of it, such being taken through the crank shaft, the eccentric shaft and one of the bearings of the latter to be hereinafter described.

In such drawings, A, exhibits the supporting frame of the trip hammer and its operative mechanism, the upper part, *a*, of the said frame being constructed tubular or in a suitable form to receive and guide an air spring cylinder, B, placed within it. This air spring cylinder is constructed like the cylinder of a common steam engine with the exception that instead of having pipes or passages of induction opening into its opposite ends, it has but one hole or passage, *b*, made through its side and midway between the two heads of the cylinder. A piston, C, is arranged within the cylinder and has its rod, *c*, extending through the lowermost head of the cylinder, and attached to a hammer, D, as shown in the drawings. Furthermore, there is a long slot, *d*, formed through the side of the rear portion of the tubular guide, *a*, such slot being for receiving and guiding a projection, *e*, from the cylinder. A journal, *f*, extends from the said projection, *e*, and through a connecting rod or pitman E, whose lower end is connected in a similar manner to a crank F, extended from one end of a horizontal shaft, G. The said shaft, G, runs longitudinally through another shaft H, the axis of the shaft, G, being eccentric with reference to that of the shaft, H. The latter shaft, H, has its journals *h*, *h*, supported respectively in boxes, I, I, carried by the frame, A, as shown in the drawings. On the end of the shaft, G, a toothed pinion, K, is fastened, the said pinion being made to engage with a larger gear, L, fixed on the axle or arbor of a fly wheel, M. By putting the said fly in revolution, rotary motion will be imparted to the shaft G, whereby, by means of the crank, F, and connecting rod, E, rapid reciprocating vertical movement will be given to the pneumatic or air spring cylinder B, and in consequence of the same, the hammer will be lifted from and forced downward toward the anvil, N, or any article thereon, by the condensation of air in the opposite halves or portions of the cylinder. That is, during each elevation or depression of the cylinder, the piston head will pass by the air passage, *b*, and compress all the air that may be contained in the cylinder and between said passage and that head of the cylinder which may be approaching the piston head. This compression of the air, while the cylinder is ascending will operate as a spring to gradually overcome the inertia of the trip hammer and prevent the piston head from coming in contact with the lower head of the cylinder. So during the descent of the cylinder, the air will be compressed in a similar manner within its upper part and will operate to accelerate the downward movement of the piston. By such means the trip hammer may be worked with a series of rapid strokes and with little or no danger of upsetting its piston rod or of any injury occurring to the heads of the cylinder.

In order to adjust the path of movement of the cylinder more or less with reference to the thickness of an article to be hammered, the eccentric shaft, H, is applied to the driving shaft, G, in manner as hereinbefore described. By laying hold of and rotating the shaft, H, or by having any suitable mechanism applied to it for effecting its rotation, the altitude of the shaft, G, may be varied more or less so as to produce a corresponding variation in the altitude of the path of movement of the pneumatic cylinder.

I do not claim the combination of a cylinder and piston with a weight or hammer, as such cylinder and piston applied to a hammer and so as to raise it by the pressure of steam let into the cylinder while the latter is stationary is not new—but

What I do claim is—

1. My improved means of operating the hammer, that is by an air spring cylinder substantially as described (or its equivalent) applied to the piston and combined with mechanism by which a rapid reciprocating rectilinear motion may be imparted to such

cylinder essentially in manner and so as to operate the piston and hammer as specified.

2. I also claim in combination with the piston trip hammer, the air spring cylinder, and the mechanism for imparting to the latter reciprocating rectilinear motions as described, mechanism substantially as specified for varying the altitude of the path of movement of the cylinder under circumstances as explained, such mechanism as above described consisting of an eccentric bearing shaft, H, applied in boxes, I I, and to the crank shaft, G, of the cylinder, B, substantially as specified.

BENNET HOTCHKISS.

Witnesses:

C. R. INGERSOLL,

GEO. H. WATROUS.