G. E. SELLERS.

Drop Hammer.

No. 3,882. Patented Jan'y 10, 1845.

Fig. 2

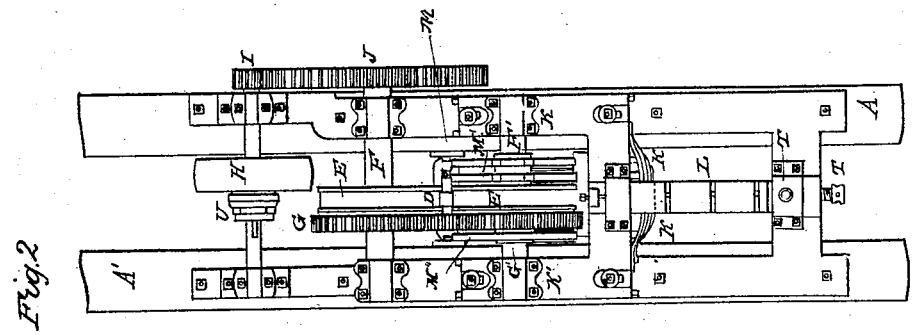
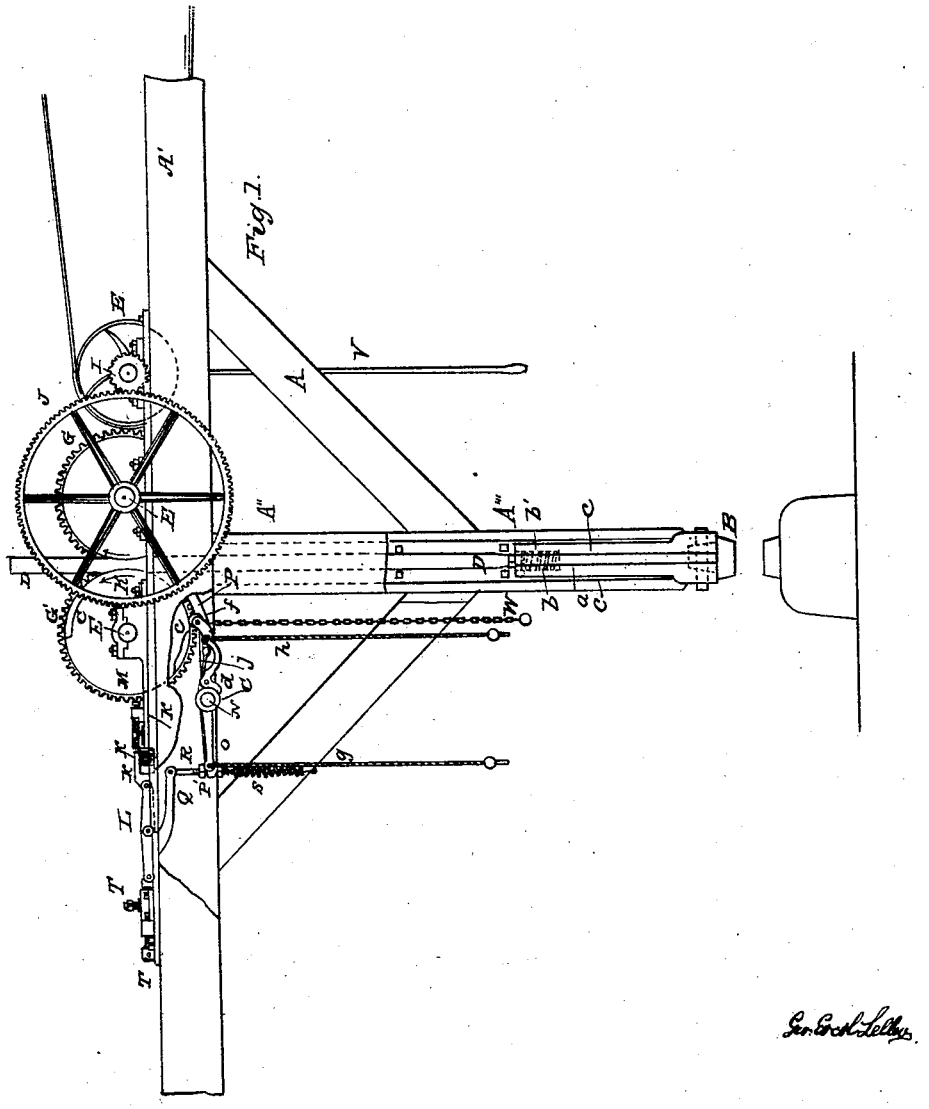


Fig. 1.



Geo. E. Sellers.

UNITED STATES PATENT OFFICE.

GEORGE E. SELLERS, OF CINCINNATI, OHIO.

MANNER OF WORKING FORGE-HAMMERS.

Specification of Letters Patent No. 3,882, dated January 10, 1845.

To all whom it may concern:

Be it known that I, GEORGE ESCOL SELLERS, of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in the Manner of Constructing Apparatus for Working Vertical Forge-Hammers; and I do hereby declare that the following is a full and exact description thereof.

In the accompanying drawing, Figure 1, is a side view, and Fig. 2, a plan, or top view, of my vertical hammer apparatus.

A, A, is the frame, the beams, A′, A′, of which may extend into the side walls of the building, or be otherwise supported. From these beams descend two vertical timbers, A″, A‴, which are shown as sustained by the braces, A, A; the vertical timbers, A″, A‴, serve as checks, to receive the guides of the hammer, B, which is to rise and fall, vertically, between them. A part of the timber work constituting the frame is omitted, or supposed to be removed, for the purpose of showing parts of the machinery which would otherwise be hidden.

C, C, is the iron stock which may serve as a socket to receive the hammer, B, and have grooves, *a*, *a*, in it to receive guide tongues within the vertical timbers. To the upper end of this stock is attached the lifting rod, D, D, which is represented as a square bar of iron. In attaching this rod to the head of the hammer stock, I pass it into a cavity in the upper end thereof, and surround it by a strong spiral, or other, spring, *b*, *b*, which serves to prevent a sudden jerk in the first impulse of raising the hammer; a spring may, also, be inserted to relieve the lifting-rod in its descent, and prevent its upsetting. The lifting rod, D, D, extends up so as to be received between two friction drums, E′, E′, which are to embrace it firmly between them when the hammer is to be lifted. These friction drums are attached to the shafts, F, F′, which run in plummer blocks, in the usual way. Upon the same shafts are the toothed wheels, G, G′, which, gearing together, cause the friction drums to revolve simultaneously.

H, is a driving pulley, which may receive a belt, and be actuated by any adequate motive power. I, is a pinion on the shaft of said pulley, gearing into the toothed wheel, J, on the shaft of the friction drum, E. The friction drum, E′, has its shaft, F′, on a sliding frame, K, K, which is allowed to traverse back and forth to a short distance, so as to cause the lifting rod, D, D, to be embraced between the friction drums, or to leave it free.

L, L, is a toggle joint by which the motion of the sliding frame is governed, in a manner to be now described.

Upon the shaft, F′, there are fixed two, or more, wheels, M, M′, M″, which I will call cam wheels, as they are to operate, to some extent, in the manner of cams. These cam wheels determine the number of strokes that the hammer shall make in one revolution of the friction drums. When the hammer is to make one stroke only, a portion of the periphery of the cam wheel that regulates it is cut away in one place only; where two strokes are to be made, the periphery of the cam wheel is to be cut away in two places, as seen at *c*, *c*, on the wheel, M, Fig. 1. Each of the cam wheels has assigned to it an apparatus which is under the control of the forgeman, allowing him to bring one, or the other, of them into action at pleasure; as this apparatus is similar in each, a description of that which governs the wheel, M, will serve for the whole.

N, is a rock-shaft which crosses the machine, and has its end bearings in the timbers, or beams, A′.

O, O, is a lever which has its fulcrum on the shaft N, on which it turns, freely when a catch, *d*, is not engaged in a notch on said shaft or on a collet *e*, made fast to it. On the inner end of the lever, O, there is a friction roller *f*, that bears against the periphery of the cam wheel M. *g* and *h* are lines attached to, and operating upon, the lever, O, near its opposite ends; when the line, *g*, is drawn down, it forces the friction roller, *f*, against the periphery of the cam wheel, and when the line, *h*, is drawn down, it performs the double action of relieving the catch *d*, from the notch on *e*, and drawing the roller *f*, from its contact with the cam wheel; this it effects by allowing the line *h*, to pass over a pulley, *i*, on the upper side of the lever, O, and attaching its end to the outer end of the catch, *d*; this catch has its fulcrum pin made fast to the lever O, and is forced against the collet, *e*, by a spring, *j*, which causes it to catch in the notch when the catch is brought into the proper position, by the action of the line *g*.

There is another lever, P, P′, which is permanently attached to the rock shaft, N; the inner end of this lever extends nearly into contact with the lifting rod, D, for a purpose to be presently explained; its outer end, P′, is connected to the arm Q, by which the toggle joint is raised, or lowered; the connecting rod, R, is furnished with nuts by which the play of the toggle joint may be adjusted; S, is a spring which may be used to aid in causing its prompt action.

T, T, are adjusting screws, by which the toggle joint may be set, so as to regulate the action of the sliding frame, K. A strong spring, *k*, *k*, receives the immediate action of the toggle joint, and bears against the outer end of the sliding frame; this serves to compensate for any want of truth in the friction drums, or in the lifting rod, D, causing the former to bear equably on the latter.

U, Fig. 2, is a clutch, operated on by the rod V, Fig. 1, which clutch serves for throwing the machine in and out of gear.

When the machine is in action, the friction drums, E, E′, revolve in the direction of the arrows, and by drawing down the line, *g*, the notch on the collet, *e*, will be moved around so as to receive the catch, *d*, which will cause the lever, O, to be temporarily attached to the rock shaft, N; and the revolving of this shaft will, by the action of the lever, P, affixed to said shaft, force the toggle joint up, and the friction roller *f*, on the lever, O, will also be borne up against the periphery of the cam wheel, M; the friction drum, E′, will then be forced into contact with the lifting rod, D, and the hammer will be raised. When the roller *f*, arrives at one of the recesses, *c*, in the cam wheel, the outer end of the lever, O, will be drawn down, and with it the toggle joint, and the hammer rod being thereby relieved from the pressure upon it, the hammer will descend; and any required number of strokes may thus be made by the hammer during the revolution of the cam wheel, this being dependent upon the number of recesses made in its periphery.

A most decided advantage resulting from this arrangement, is that a blow of equal force may be given to the article which is being forged, whatever may be its thickness, so long as the same cam wheel is kept in action, as the height to which the hammer is lifted will always be the same, measuring from the point at which it is arrested. With the common trip hammer, the larger the size of the iron to be forged, the shorter is the stroke of the hammer, when it should, in fact, be the greatest. In upending a bloom, for example, the fall of the common trip hammer is frequently so limited as to produce but little effect; with my hammer, on the contrary, although the first blow in upending a bloom will be as much shorter than the preceding one on its side, as is equal to the difference between its thickness and its length, the second blow will be given from the same height as when the hammer struck upon its side. Should the forgeman wish to change the force of the blow, this can be done instantaneously without stopping the machine, all that is necessary being to draw upon the line *h*, which will relieve the catch *d*, and remove the lever O, from its cam wheel; and by drawing at the same time upon another line, attached, like *g*, to the lever of another cam wheel, such wheel will be set into action.

Should the forgeman desire to vary the force of the blows in such manner as to strike irregularly on any piece, this may be done by the aid of the lever P, to the longer end of which a chain, W, is attached for that purpose; the other levers being thrown out of action the forgeman may take hold of the ring on the end of the chain, and by alternately drawing the lever P, down and suffering it to rise, he may keep the friction drums in contact with the lifting bar for such length of time, or as frequently, as he may desire; as each time he draws upon the chain, the friction drums will grip the bar, and on ceasing to draw upon the chain the hammer will fall. The lever, P, as before remarked, is made to extend nearly to the lifting rod, and this is necessary to the security of the apparatus, as without this device, should the forgeman neglect to relax his draft upon the chain, the hammer stock would be brought into contact with the friction drums and destroy the machine; but under the arrangement above described, the head of the stock will be brought up against the end of the lever, P, and cause the hammer to fall. Another precaution is necessary to prevent injury from the throwing of more than one of the levers, O, into gear at the same time, namely, that the cam wheels should be so placed upon the shaft, E′, as that one of the recesses on the periphery of each of them shall be in the same horizontal line; this precaution will secure the falling of the hammer in one revolution of these wheels, whatever may be the number of them in action.

I have shown a spiral spring, S, as used to insure the prompt descent of the toggle joint, by attaching one end of such spring to the outer end of the lever, P. It may be found advantageous, also, to attach spiral, or other, springs to the sliding frame K, to aid in drawing it back when the friction rollers, *f*, enter the recesses on the cam wheels.

Having thus, fully described the manner in which I construct my vertical forge hammer apparatus, and shown the operation of

the respective parts thereof, what I claim therein as new, and desire to secure by Letters Patent, is—

1. The manner of operating upon the lifting rod by means of the friction drums, one of which is made to advance to, and to recede therefrom by being placed on a sliding frame which is operated upon by a toggle joint, under an arrangement of parts substantially the same with that herein described.

2. I also claim the manner of arranging the respective levers, O, and P, the catch, *d*, the cam wheels, M, and their appendages, so as to be operated upon by the lines and chain attached to the said levers, substantially as herein fully made known.

3. And I do hereby declare that I do not intend by these claims to limit myself to the precise form and disposition of the respective parts of said machine, but to vary these as I may think proper while I attain the same end by equivalent means.

GEO. ESCOL SELLERS.

Witnesses:
THOS. P. JONES,
EDWIN L. BRUNDAGE.