

No. 715,598.

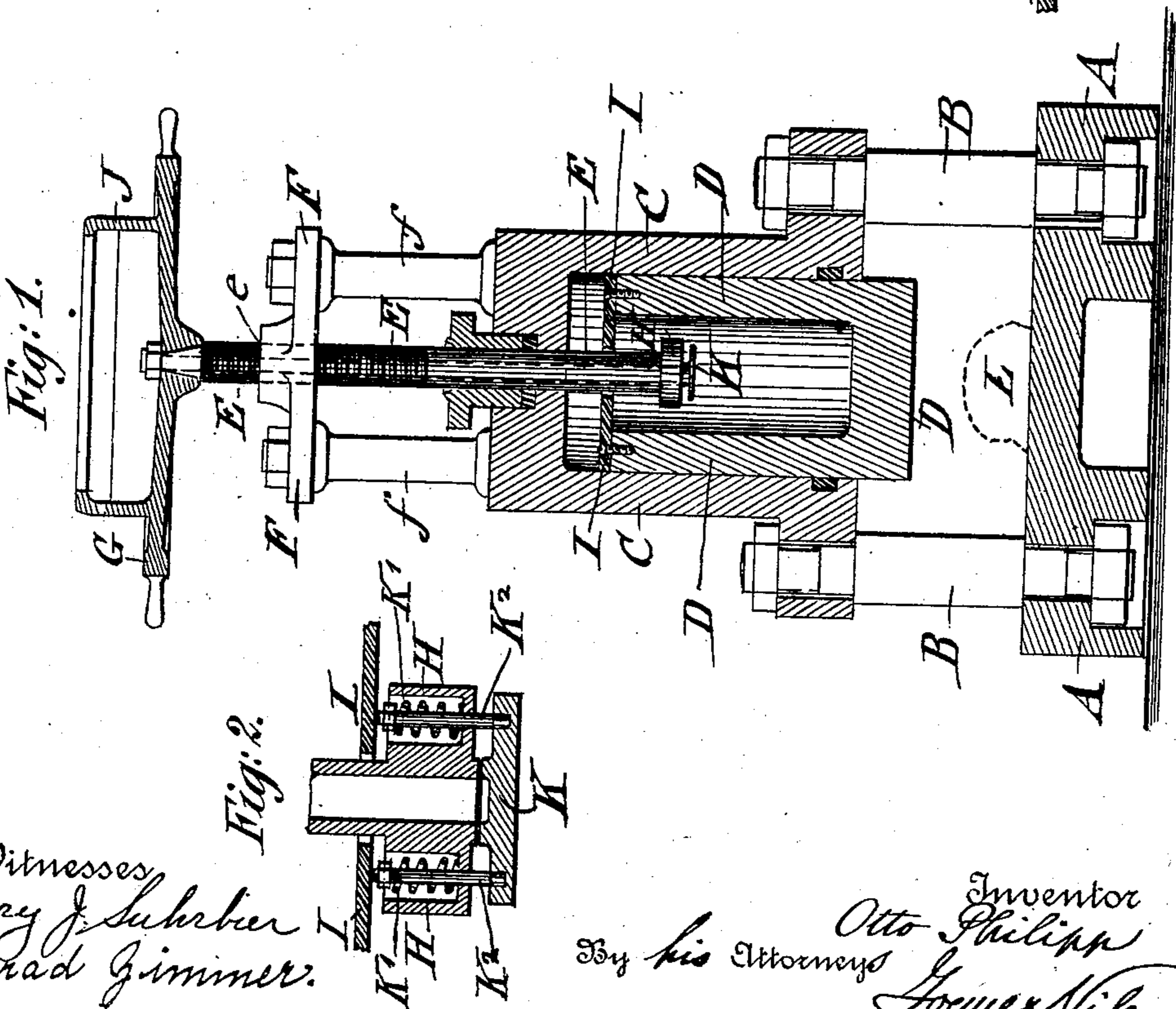
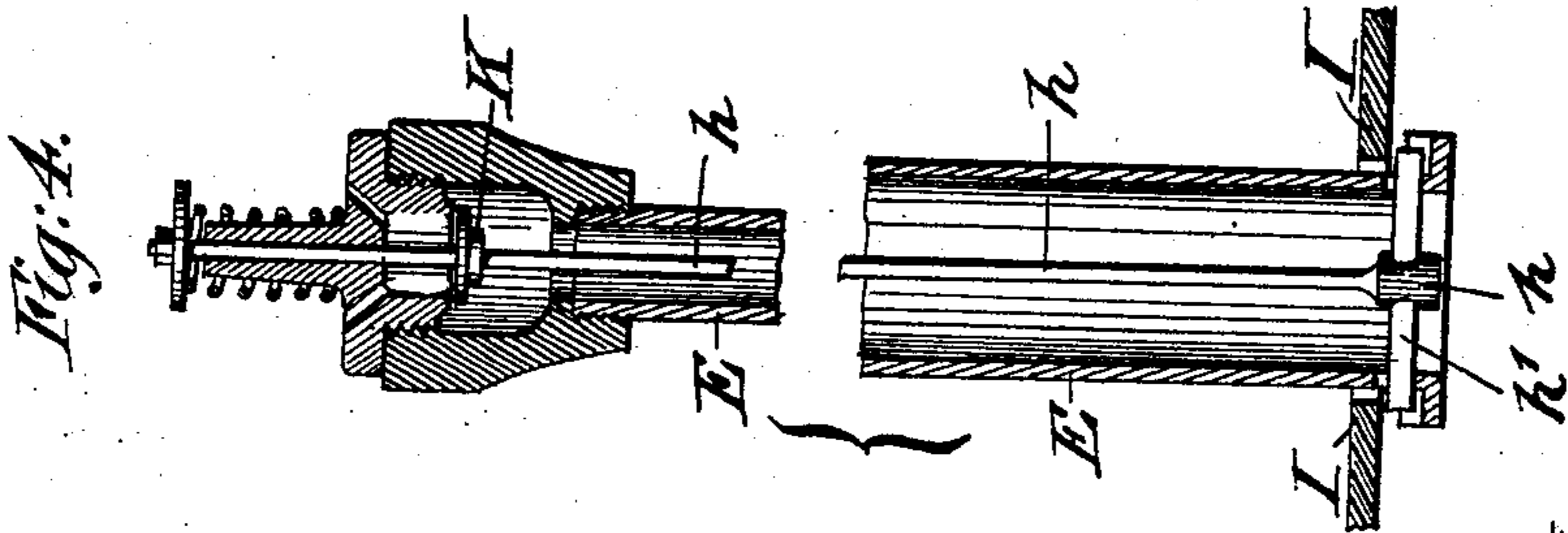
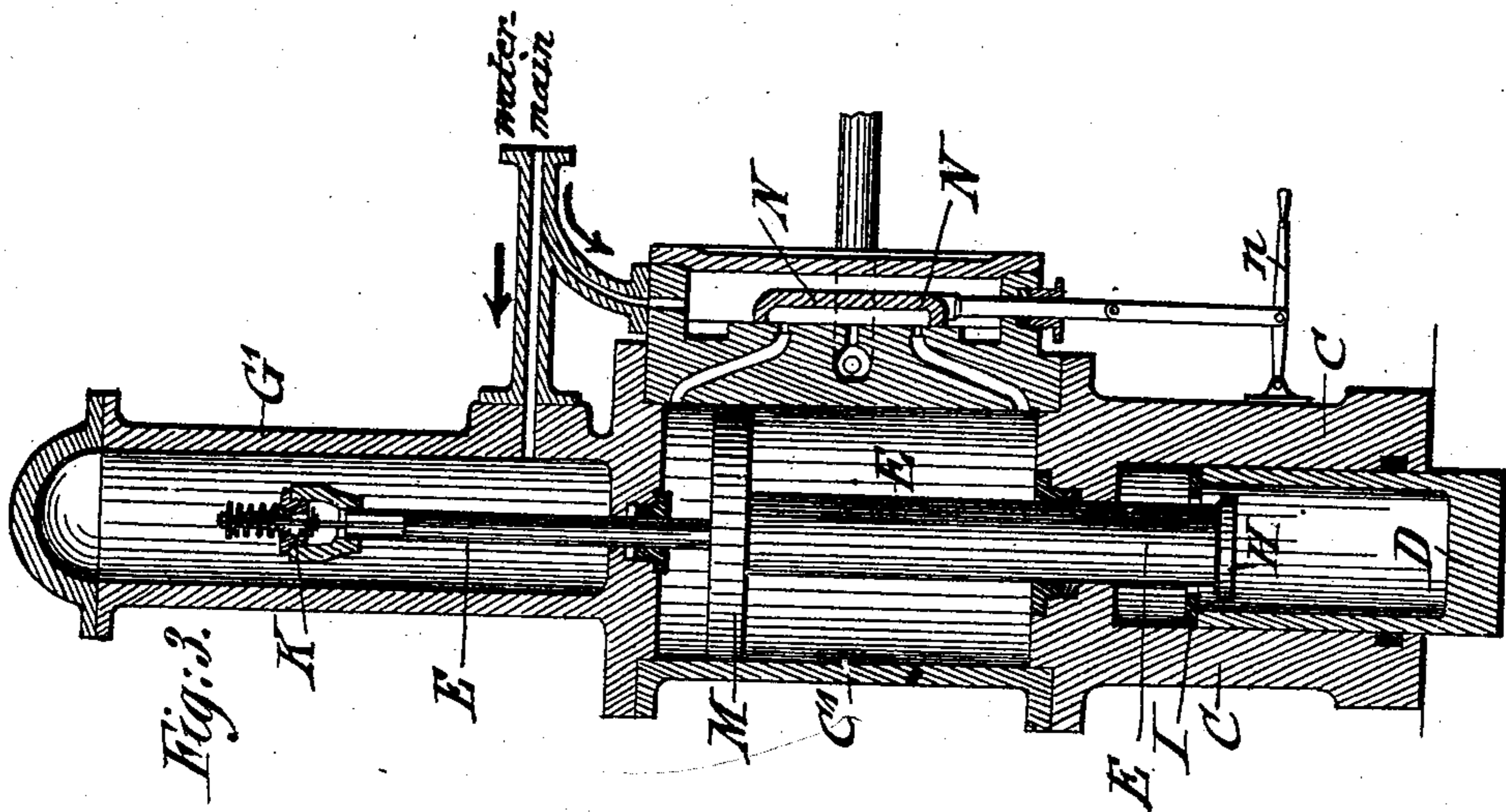
Patented Dec. 9, 1902.

O. PHILIPP.

HYDRAULIC PRESS.

(Application filed July 29, 1902.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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## HYDRAULIC PRESS.

SPECIFICATION forming part of Letters Patent No. 715,598, dated December 9, 1902.

Application filed July 29, 1902. Serial No. 117,434. (No model.)

*To all whom it may concern:*

Be it known that I, OTTO PHILIPP, a citizen of the Empire of Germany, residing in Köthen, in the Duchy of Anhalt, in the Empire of Germany, have invented certain new and useful Improvements in Hydraulic Presses, of which the following is a specification.

In many hydraulic presses the high pressure is produced by forcing a screw-spindle into the interior of the cylinder to displace and compress the pressure fluid therein. Presses of this type as heretofore constructed required several operations to be performed for each complete pressing operation.

The object of this invention is to simplify the operation of pressing by utilizing the screw-spindle not only for producing the high pressure, but also for actuating the main plunger or ram and for permitting the ingress and egress of the pressure fluid into and from the cylinder. The complete pressing operation may then be effected by merely screwing the spindle into the press-cylinder, the press being released and returned to its normal condition by merely unscrewing the spindle; and for this purpose the invention consists of a hydraulic press comprising a cylinder, a main plunger or ram, a pressure-augmenting spindle provided with a collar adapted to engage the main plunger or ram, said spindle being made tubular to permit the ingress and egress of the pressure fluid into and from the plunger and cylinder, and a valve on said spindle so constructed and arranged as to close automatically and be kept open when the plunger is suspended on the collar of the spindle; and the invention consists, further, of certain details of construction and combinations of parts, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical central section of my improved hydraulic press. Fig. 2 is a detail vertical section of the valve on the end of the spindle. Fig. 3 is a vertical central section of a modified construction of the hydraulic press, and Fig. 4 is a detail vertical section through the spindle and valve of the press shown in Fig. 3. Similar letters of reference indicate corresponding parts.

Referring to the drawings, A is the base-

plate, on which is supported, by means of upright columns B, the cylinder C of my improved hydraulic press.

D is the main plunger or ram, and F a cross-head that is mounted above the cylinder on suitable columns *ff*, said cross-head being provided with an interiorly-threaded opening *e*, in which the pressure-augmenting spindle E is screwed up or down. This spindle is hollow, as indicated in dotted lines in Fig. 1. The spindle is rotated by a hand-wheel G with a water-tank J.

On the lower end of the spindle E is arranged a collar H, which engages with a plate or cross-piece I, that is attached to the upper end of the hollow plunger D, so as to lift the latter when the spindle E is raised.

The lower end of the hollow pressure-augmenting spindle E is provided with a valve K, which is shown in Fig. 2, and which is so arranged as to automatically close the lower end of the tubular spindle by the internal pressure of the fluid. To the valve K are attached suitable guide-rods  $K^2$ , while helical springs  $K'$  are placed on said guide-rods and interposed between the bottom of the collar H and screws-nuts on the upper ends of the guide-rods  $K^2$ . The guide-rods  $K^2$  extend slightly above the upper edge of the collar H, so that when the plunger D is suspended from the latter the valve will be opened by the contact of said guide-rods with the plate I. The springs  $K'$  must permit the pressure of the water-column contained in the tubular spindle E to open the valve K.

The press is operated in the following manner: When the tubular pressure-augmenting spindle E is in raised position and the plunger D suspended therefrom, the valve K is open and the tank J in communication with the cylinder C of the press. When the spindle E is screwed downward, the main plunger or ram descends on the material L to be pressed by reason of its own weight, supplemented by that of the water-column above it. The material L is thus slightly compressed and the plunger prevented for a time from descending. As the pressure-augmenting spindle E continues its travel into the cylinder C the valve K is closed automatically, so that the water in the cylinder cannot escape, while the displacement and consequent com-

pression of the water effected by the further entrance of the spindle raises the pressure to that required, which may be several hundred atmospheres. This completes the pressing operation. To release the press, the spindle E is screwed upward, which gradually relieves the pressure, so that the valve K is opened automatically, placing the cylinder and tank in communication, and finally the collar H lifts the plunger or ram D into its original position, thereby forcing the water in the cylinder back to the tank.

The modified construction of hydraulic press (shown in Fig. 3) operates exactly in the same manner; but instead of operating the tubular spindle E by means of a screw nut and thread on the spindle it is operated by means of pressure that is obtained from an ordinary water-main, which acts on a piston M, attached to the spindle and arranged in an auxiliary cylinder C', that is located above the main cylinder C. The water is supplied by means of a slide-valve N, which is operated by a suitable hand-lever *n*. Water is also supplied to a closed cylindrical tank G', that surrounds the upper end of the spindle E, the valve K being in this case arranged at the upper end of the spindle and operated by means of a valve-rod *h*, which is provided at the lower end with a cross-piece *h'*, located in the recessed lower end of the spindle, as shown clearly in Fig. 4. The valve K is arranged at the upper end of the spindle, so as to provide more convenient access to the same for cleaning and repairing. The slide-valve N is not a normal D-valve, but a so-called "elongated" D-valve, which laps over both supply-channels, so that the water can pass from the space below the piston M to the space above the same, and vice versa, during the so-called "transfer" period. The slide-valve N is shown in Fig. 3 in position for transferring the water from the lower end to the upper end of the auxiliary cylinder, so that the piston M moves the spindle E with it in downward direction, whereby during the time when the plunger is lowered on the material to be pressed no water is used in the cylinder. The cylindrical tank or reservoir G' is closed and is connected with the same water-main, so that the first pressing operation takes place with a somewhat stronger pressure than with the press shown in Fig. 1. By moving the slide-valve by means of the hand-lever in downward direction the water acts then directly on the upper part of the piston, which, in connection with the pressure of the water transmitted from the tank G' and which goes down into the hollow plunger and cylinder, produces the final pressing. By shifting the slide-valve into uppermost position by the hand-lever water is supplied to the under side of the piston M, so that thereby the plunger, spindle, and piston are returned into starting position ready for the next operation of the press.

Various other forms of modifications of the

press may be adopted without departing from the nature of the invention. For example, the plunger D may be caused to give greater preliminary compression by using a closed water-tank with a moderate amount of internal pressure obtained directly from a compressed-air or steam pipe, or the pipe may be divided with an air-bag, and thus permitted to be mounted in any desired position or place, with the plunger working in any direction. The pressure-augmenting spindle may also be actuated by other means, while the valve K may be made in different constructions.

My improvement may be applied to hydraulic presses of various forms and also to kindred apparatus, such as hydraulic shears, riveters, and the like.

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

1. In a hydraulic press, the combination, with the cylinder and plunger, the latter being provided with a plate at its upper end, of a pressure-augmenting spindle provided with a collar at its lower end, said spindle being made tubular to permit ingress and egress of the pressure fluid into and from the cylinder and plunger, a spring-actuated valve on said spindle adapted to be engaged by the plate on the plunger so as to open said valve when the plunger is suspended from the collar of the spindle and closed automatically when clear of the plunger, substantially as set forth.

2. In a hydraulic press, the combination, with a main cylinder and hollow plunger, of a plate covering the open end of said plunger, a tubular pressure-augmenting spindle extending through the closed end of the cylinder and the plate at the interior of the plunger, a collar at the lower end of said spindle, a spring-actuated valve on said spindle, rods on said valve adapted to be engaged by the plate on the plunger so that the valve is opened when the plunger is suspended from the collar of the spindle but closed automatically when the spindle is moved into the plunger, substantially as set forth.

3. In a hydraulic press, the combination, with the main cylinder, of a plunger in the same, a plate attached to the said plunger, a tubular pressure-augmenting spindle provided with a collar at its lower end, said spindle extending through the cylinder into the plunger, a valve arranged at one end of said spindle, and means for actuating said spindle so as to permit the spindle to be moved into the plunger and close thereby the valve automatically before the final compression, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

OTTO PHILIPP.

Witnesses:

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