

(No Model.)

3 Sheets—Sheet 1.

O. H. LAWRENCE & E. M. LETTS.

PIPE BENDING MACHINE.

No. 498,126.

Patented May 23, 1893.

Fig. 1.

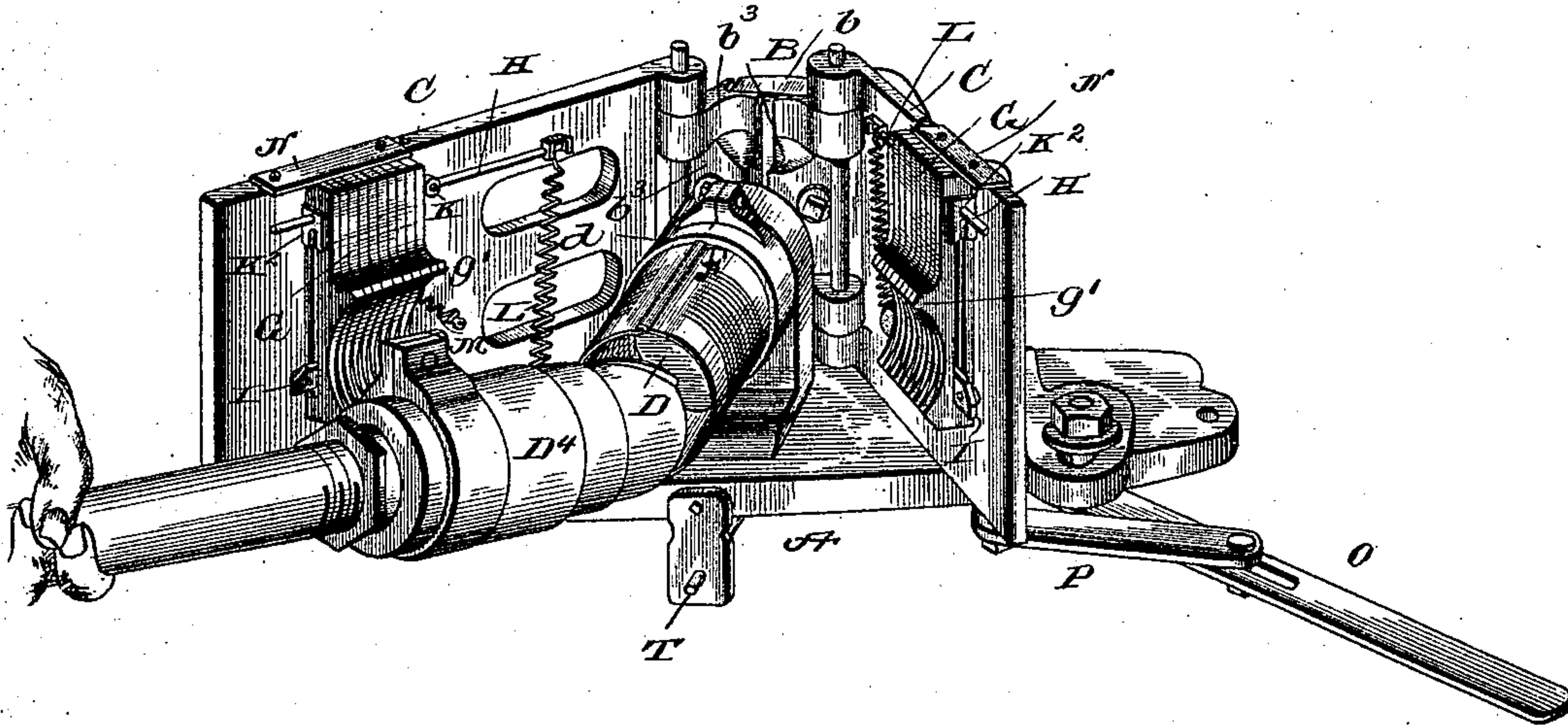
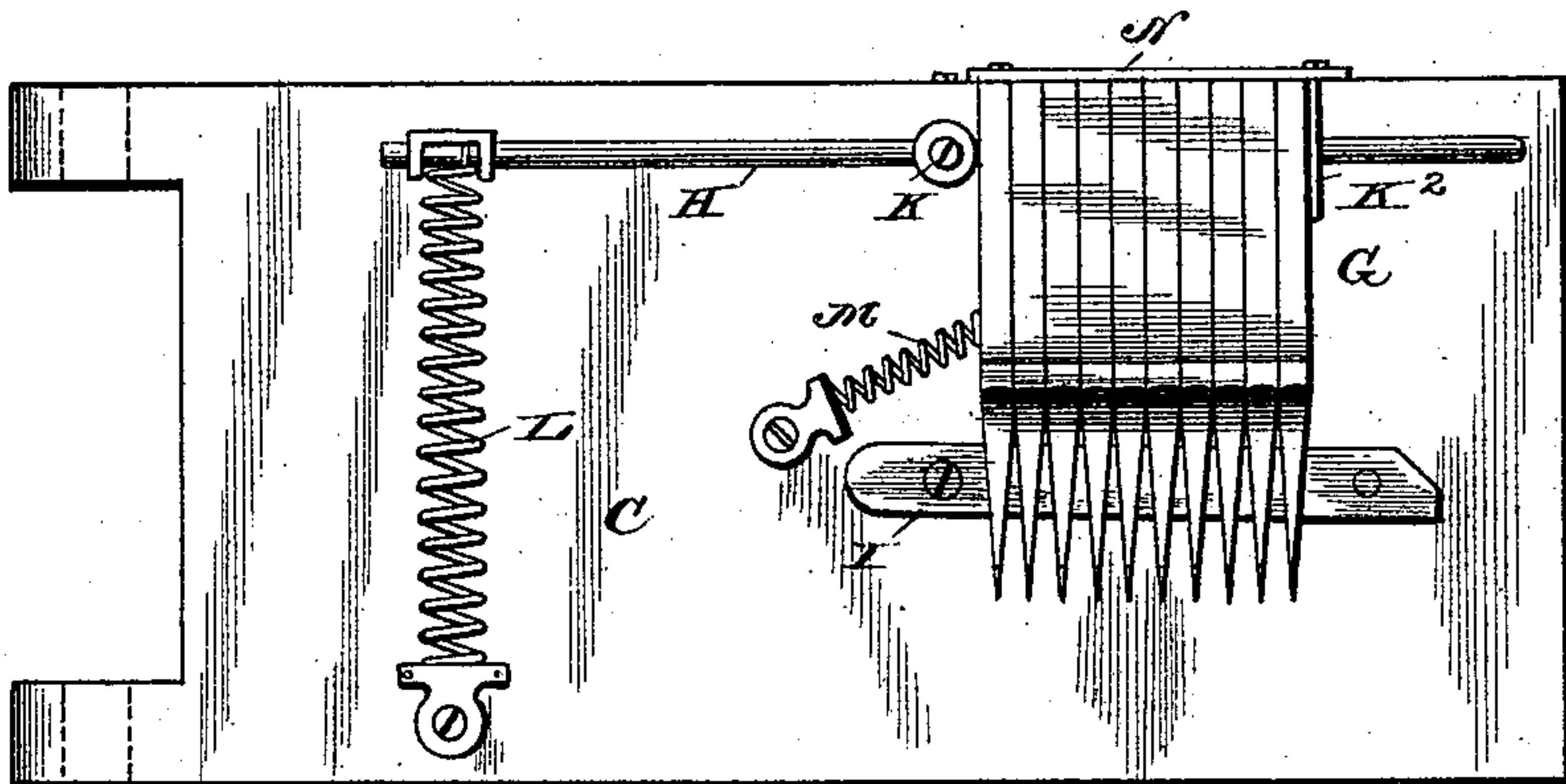


Fig. 5.



Witnesses

John Janine
R. F. Heck.

Inventors,
Orville J. Lawrence,
& Ellsworth M. Letts,
by Wm. H. Doolittle Attorney

(No Model.)

3 Sheets—Sheet 2.

O. H. LAWRENCE & E. M. LETTS.
PIPE BENDING MACHINE.

No. 498,126.

Patented May 23, 1893.

Fig. 3.

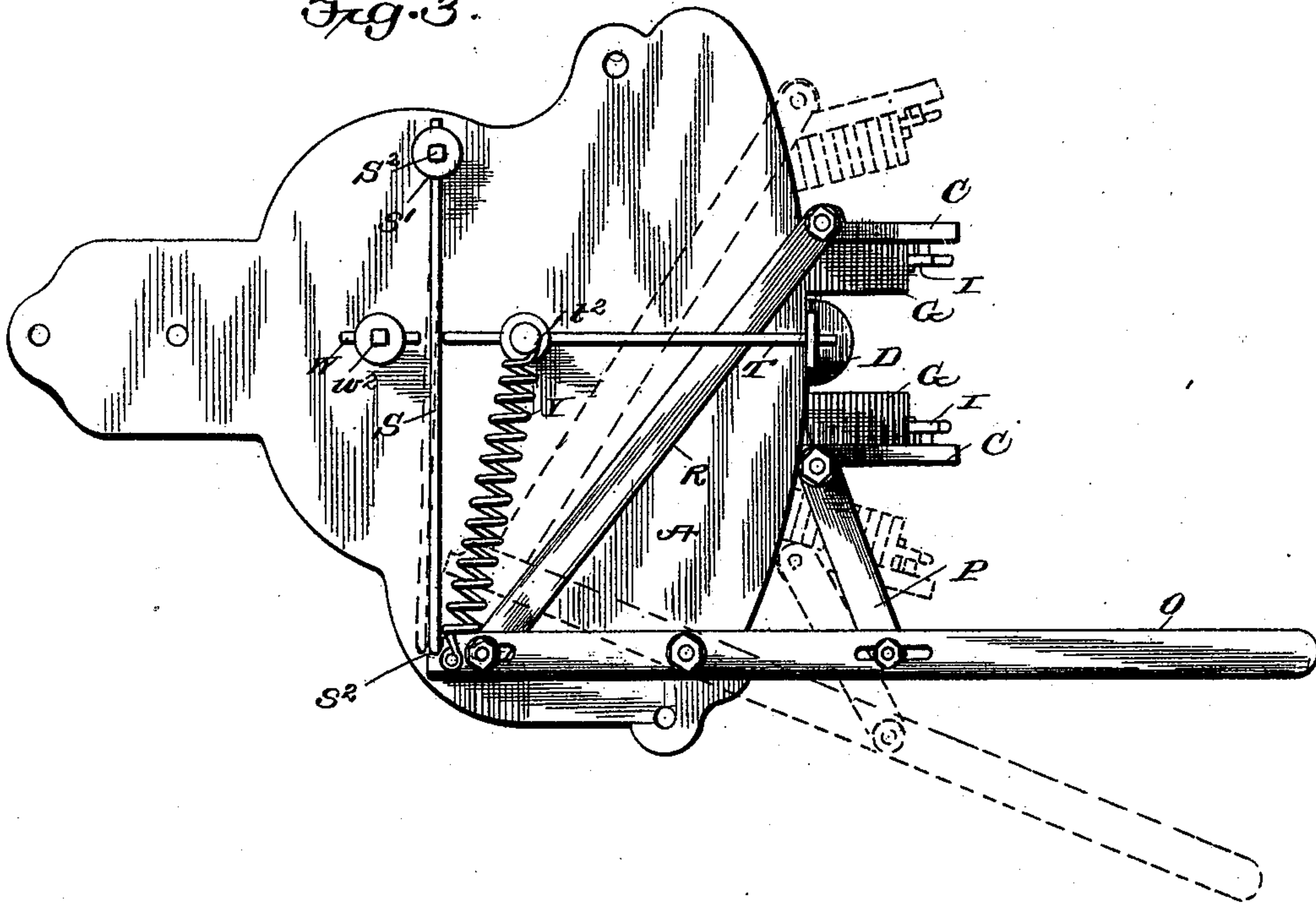
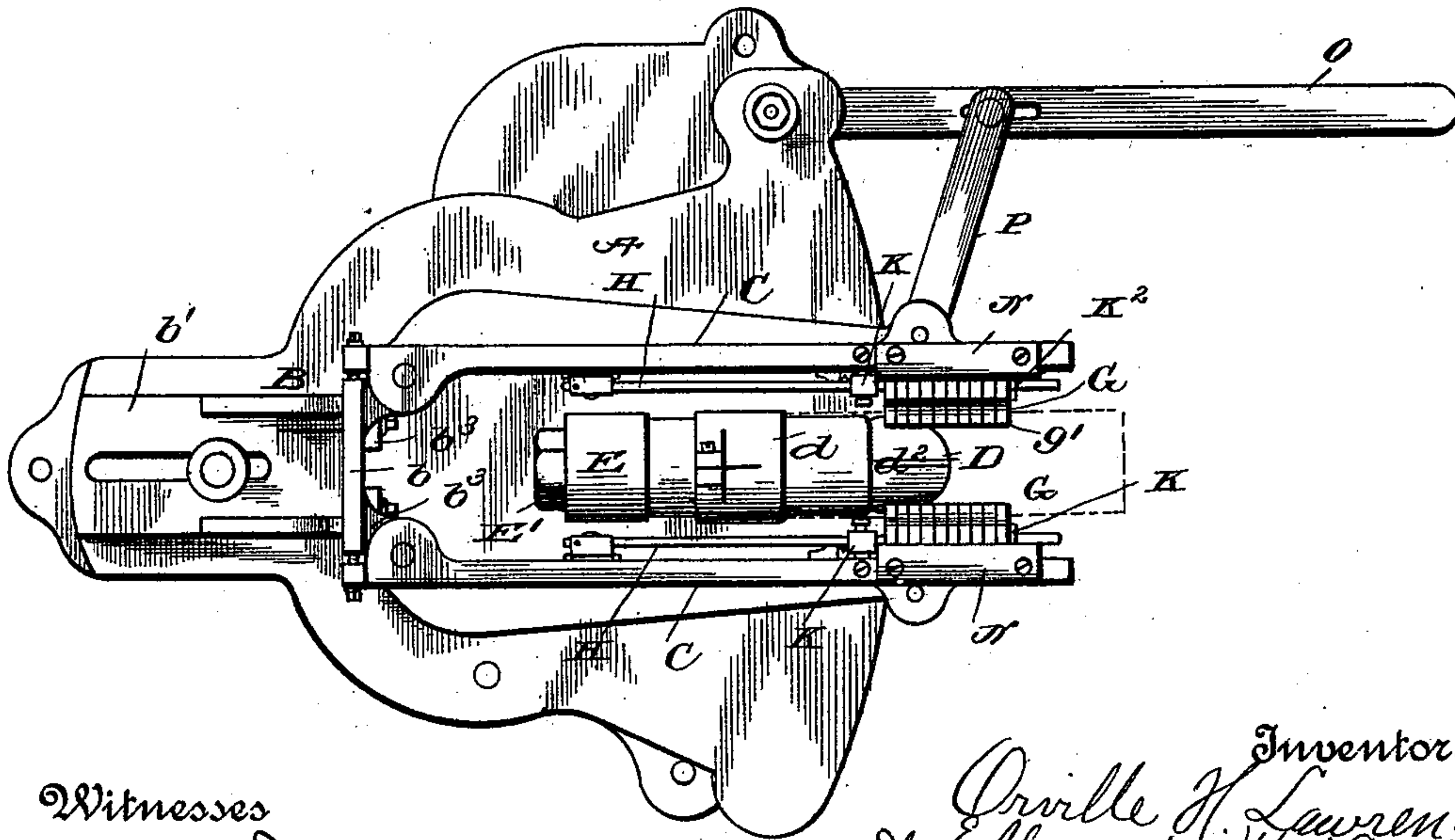


Fig. 2.



Witnesses

John Danina
R. F. Heck.

Inventors
Orville H. Lawrence
& Ellsworth M. Letts
by Wm. H. Doolittle Attorney

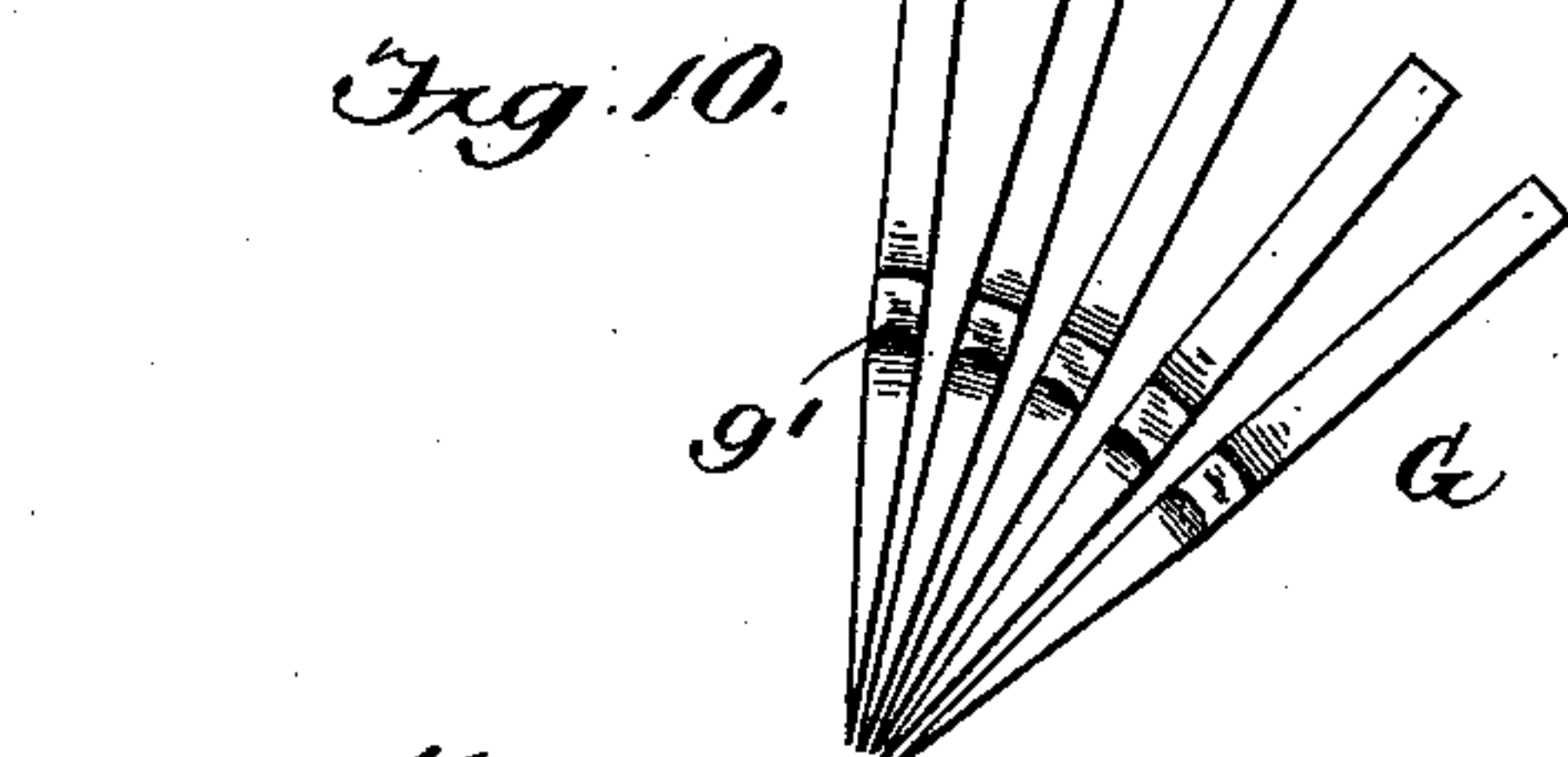
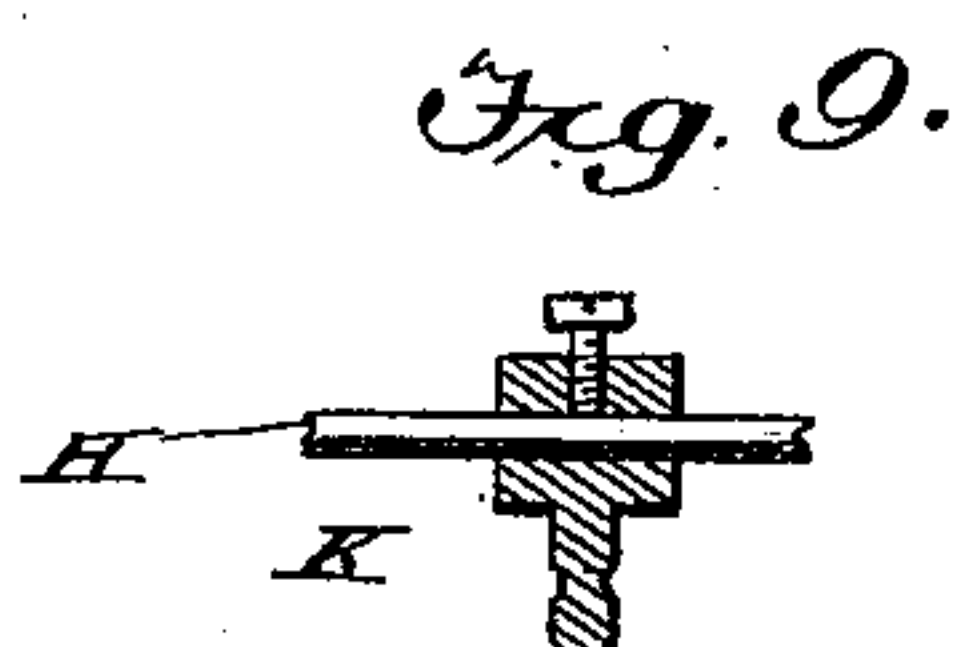
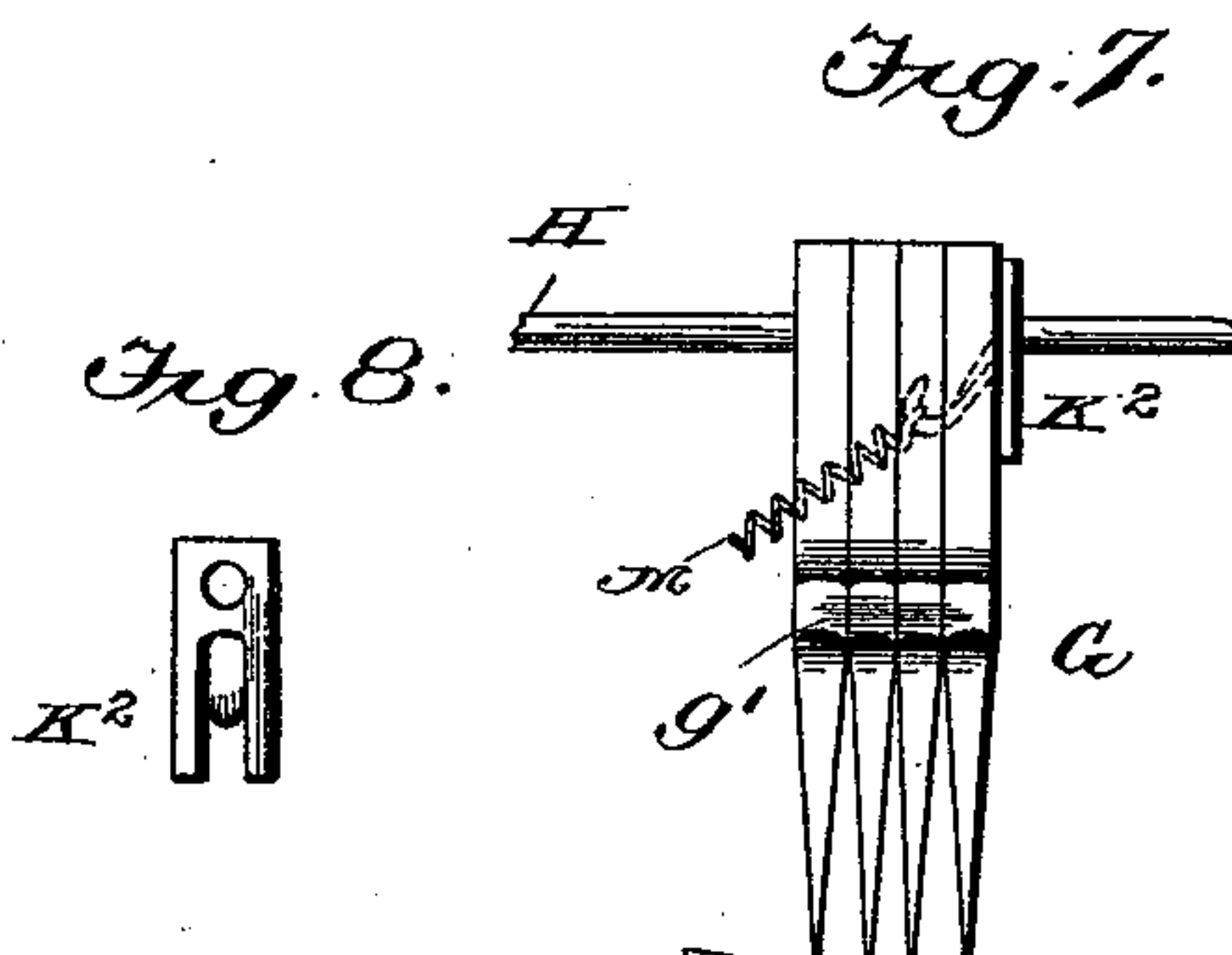
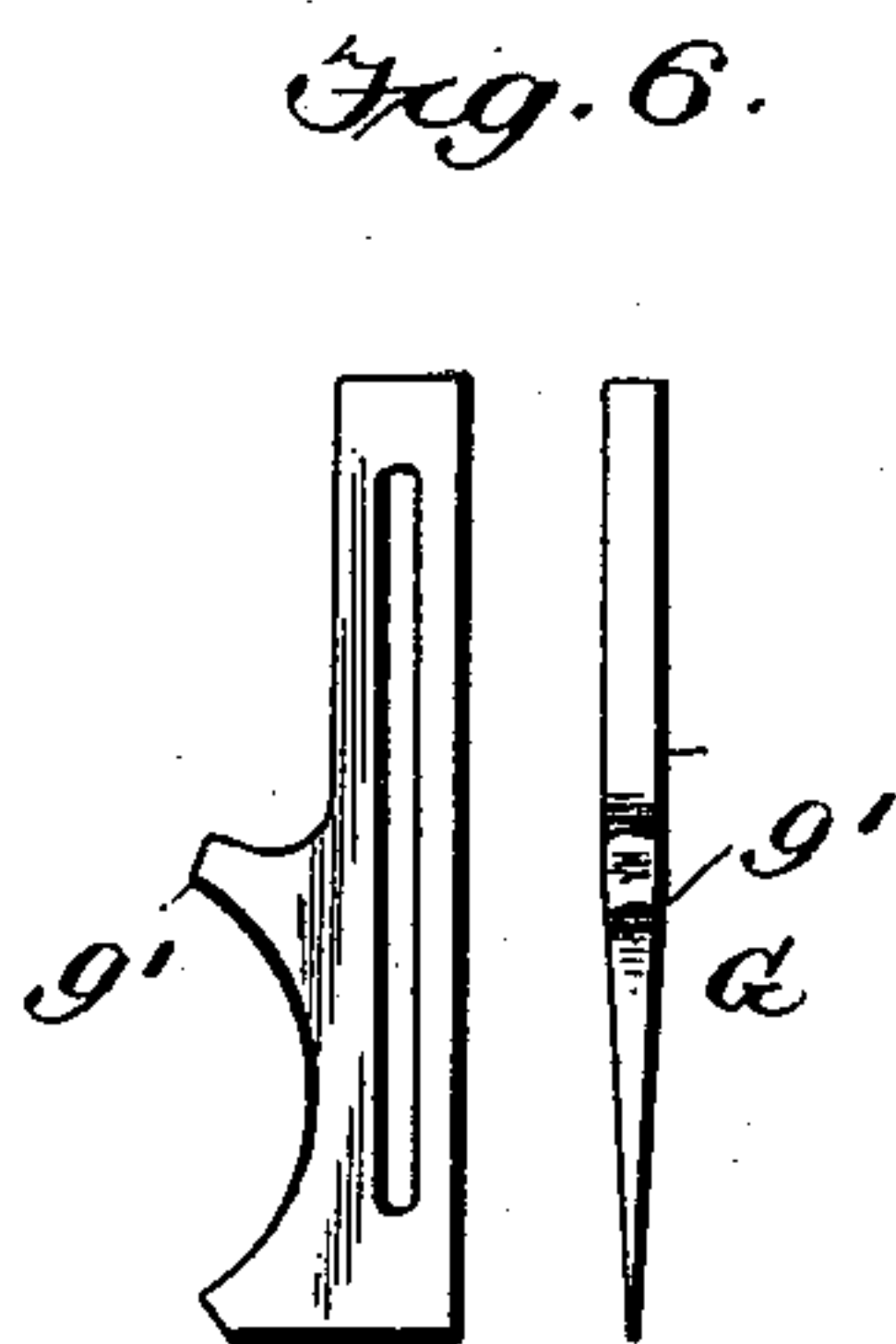
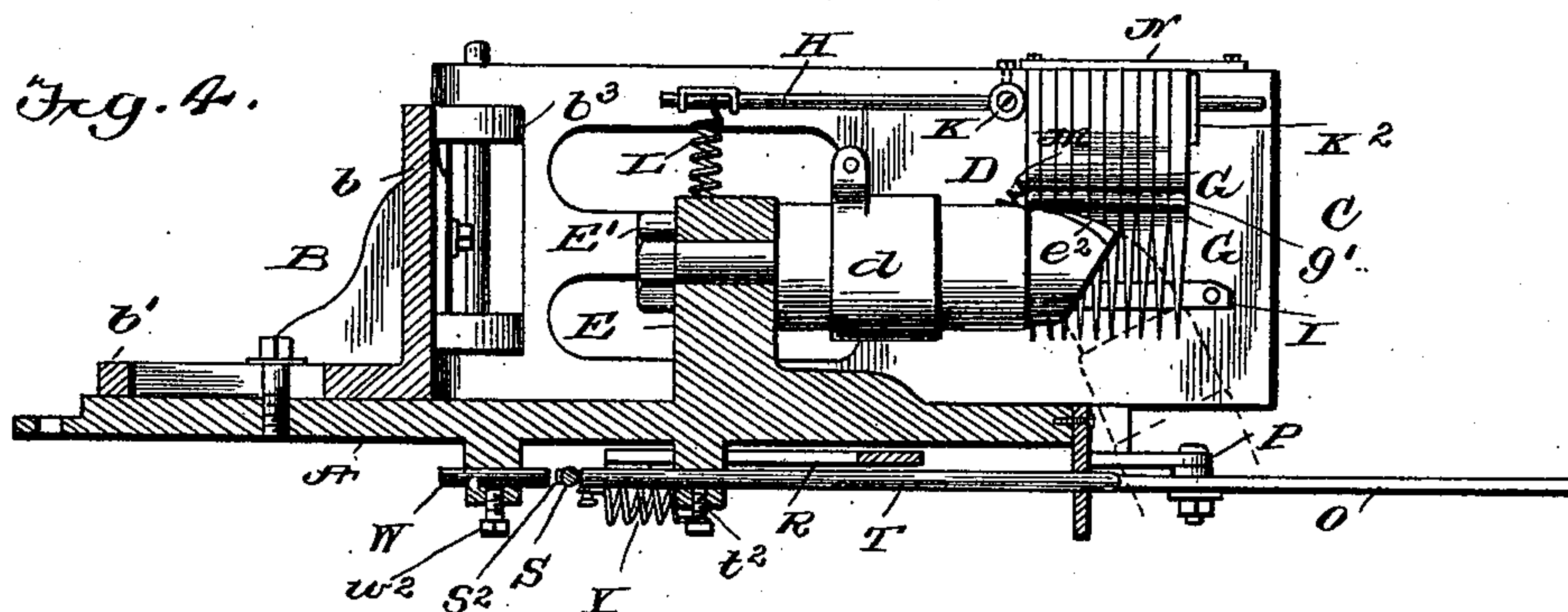
(No Model.)

3 Sheets—Sheet 3.

O. H. LAWRENCE & E. M. LETTS.
PIPE BENDING MACHINE.

No. 498,126.

Patented May 23, 1893.



Witnesses
John Danie
R. H. Heck.

Inventors
Orville H. Lawrence
& Elsworth M. Letts
by Wm. A. Doolittle
Attorney

UNITED STATES PATENT OFFICE.

ORVILLE H. LAWRENCE AND ELLSWORTH M. LETTS, OF WAVERLY, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF SEVENTENTHS TO SAID LAWRENCE AND HUGH J. BALDWIN.

PIPE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 498,126, dated May 23, 1893.

Application filed December 5, 1892. Serial No. 454,145. (No model.)

To all whom it may concern:

Be it known that we, ORVILLE H. LAWRENCE and ELLSWORTH M. LETTS, citizens of the United States, residing at Waverly, in the county of Tioga and State of New York, have invented certain new and useful Improvements in Pipe-Bending Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention consists of a machine for forming pipe elbowssuch as shown, described and claimed in a patent granted to Orville H. Lawrence one of the applicants, October 25, 1892, No. 485,124. The subject of that patent is a sheet metal elbow formed from a tube having corrugations and bent into final shape by compressing the corrugations upon one side thereof.

Our invention, comprising a machine for compressing and finishing such an article, is illustrated in the accompanying drawings, in which—

Figure 1, is an end elevation partly in perspective showing the machine opened and holding a section of corrugated pipe to be bent. Fig. 2, is a top plan view of the machine and Fig. 3, a bottom plan view showing the wings held against the pipe in full lines, and thrown open in dotted lines; Fig. 4, a longitudinal section of the machine; Fig. 5, a detail of a set of fingers for gripping the corrugated pipe in connection with the plate on which they are carried; Fig. 6, a detail of one of these fingers; Figs. 7, 8 and 9, details showing mode on which these fingers are hung on their support; Fig. 10, a detail showing the relative position of the fingers when the pipe is corrugated. Figs. 11 and 12, are details of an adjustable and extensible standard.

Referring to the drawings, A, represents the bed plate supporting the operating parts of the machine.

B, is an adjustable and extensible standard rising from the bed plate, and constitutes an end support for separate side-wings, C, C, which are hinged to said support. The standard, B, is composed of three parts, first an upright, *b*, having a slotted lug, *b'*, and through

which passes a set screw into the bed plate, and by which means the standard, B, is adjusted lengthwise of the machine; second, plates *b*³, *b*³, secured to the upright, *b*, by means of set screws on sides and front, as shown, whereby the standard, B, is made extensible to right and left for the purpose of setting the wings, C, C, farther in or out to accommodate a larger or smaller staking tool on which is to be placed the pipe to be bent.

D is the stationary staking tool referred to. It is secured on a slotted standard, E, rising from the bed plate by means of set screw E'.

On the staking tool or die, D, is placed a piece or section of a previously corrugated pipe, F. The stake, D, is provided with a collar, *d*, under which the end of the pipe is to be placed and held and a curved rib, *e*², on which the joint of the pipe is to rest, said curved rib to form the back circle of the elbow. The collar, *d*, can be tightened by a set-screw. The staking tool is also provided with a shoulder, *d*².

The inside plain surfaces of the wings, C, is each provided with a set of gripping fingers, G. The object of these fingers is to grip and hold the pipe when it is bent, and force the corrugations into regular folds and the number of fingers employed correspond with the number of corrugations on the pipe, so that each finger may be entered into each depression formed between the corrugations.

The fingers are shown in detail in Fig. 6. Each consists of a slotted plate having a portion of the lower end tapering downward to form a thin and pointed lower end, so as to admit of the corrugations being closely and collectively pressed together at the throat of the elbow when the pipe is bent. On one edge of and on the lower part of the plate the finger is formed in the shape of an arc, a projection, *g'* forming the top of the arc. The fingers are slotted so that they can be hung upon a rod on the wings, and so that their number can be increased or decreased according to the number of the corrugations on the pipe to be bent. There are an equal number of fingers on each wing. These fingers are hung on a top rod or lifting bar, H, and are also retained in place on the wing by a bot-

tom retaining bar, I. The fingers are given an up, down, and oscillating movement on these bars, a downward and circular movement after they grip the pipe and when the pipe is bent downward to compress the corrugations at the throat; and an upward automatic movement when they are released from the pipe. The top, or lifting bar, H, is pivoted to a wing, C, by a pivot block and set screw, K, which also serves as a stop for the fingers. One end of the bar, H, after extending through the fingers is free but next to the fingers it passes through a keeper, K². The other end of the bar, H, is secured to a spring, L, the lower end of which spring is pivoted to the wing.

The keeper, K², is a plate provided at its upper end with a hole through which the bar, H, passes, and its lower end has an open slot to pass over the retaining bar, I. It is also connected to a spring, M, which extends diagonally through the slotted fingers and is pivoted at its opposite end to a wing, C.

N, is a strap secured to the top of the wings over the fingers and the keeper, K², and answers as a stop to the upper movement of those parts.

The wings, C, or jaws as they may be termed, are operated by a series of levers, a spring, and a latch appliance, connected to the under side of the bed plate.

O, is the main operating lever which is pivoted at o', to the bed plate.

P, is a short lever arm pivoted to the main lever, O, and secured to one of the wings, C. R, is a longer arm pivoted to the bottom of lever, O, and to the opposite wing.

S, is a horizontal latch bar pivoted at one end to the bed plate at s', and is adapted to be set by set screw, S², for adjustment, with its opposite free end resting in a notch, s², formed in the lower end of the main lever, O.

T, is a sliding or angle rod arranged in bearings at right angles to the bar, S, and resting thereon, being adjustable by the bar S, at different lengths for different angles. It extends out a short distance in front of the machine so as to be operated on by the hand staking tool in the hands of the operator as hereinafter explained.

W, is an adjustable stop pivoted on a line with the sliding rod, T, and below the latch bar, S, and adapted to be set by set screw, w², so as to control the downward movement of the latch bar.

Y, is a spring secured at one end to a pin on the lower end of the hand lever and at its opposite end to a lug, t², on bottom of bed plate. This lug also forms a bearing for the sliding rod, T. The function of said spring is to automatically throw open the wings after the pipe is bent.

D⁴, is a bending tool to be used in the hands of the operator and is provided with a circular rib, a collar and a shoulder to correspond with the stationary staking tool.

The operation of the machine may be briefly

stated as follows:—The section of corrugated pipe to be bent is placed on the stationary staking tool so that first corrugation rests on rounded shoulder, d', the portion to be bent extending over the end of the tool. The main handle lever is then pulled toward said tool which carries the wings and the gripping fingers toward the pipe. The arc on the gripping fingers enters the corrugations. The operator then inserts the hand bending stake into the pipe and bends the pipe by a downward pressure. The fingers clasped between the corrugations are carried down together with the pivoted lifting bar. When the crimping is formed, the operator gives the hand staking tool a downward movement so as to strike it against the end of the sliding or angle rod, T, which is thus made to strike the latch bar, S, throwing the latter out of the notch on the main lever, whereupon the spring, Y, which has been expanded by the inward pull of the said lever carries the lever outward and thereby automatically spreads the wings open. At the same time the gripping fingers being released from the corrugations on the pipe are lifted from their normal position by the action of the springs heretofore described on the lifting bar which carries the fingers.

What we claim is—

1. A machine for bending corrugated pipe comprising a stationary staking or bending tool, on which the pipe to be bent is placed, a set of wings movable toward said tool, a set of gripping fingers on each wing to grip the corrugations of said pipe, a lever mechanism to move said wings, in combination with a hand staking tool to bend the pipe while held on the staking tool, substantially as described.

2. A machine for bending corrugated pipe comprising a stationary staking or bending tool on which the pipe to be bent is placed, a set of wings movable toward said tool, a set of gripping fingers on each wing to grip the corrugations of said pipe, a lever mechanism to move said wings and fingers against said pipe, and a spring to automatically throw open said wings, substantially as described.

3. In combination with the wings and bed plate, the levers connected with said wings to close them, a latch to hold them closed, a sliding or angle bar to release said latch, and a spring connected to said levers to throw them in the opposite direction and open the wings, substantially as described.

4. The wings in combination with an adjustable and extensible standard B provided with plates to which said wings are hinged, and levers to operate said wings, substantially as described.

5. The slotted tapering gripping fingers adapted to engage the corrugations of a pipe in combination with supports for said fingers, and mechanism for moving said supports and fingers toward and onto the pipe to be gripped, substantially as described.

6. The gripping fingers formed and adapted

to engage in corrugations in the pipe with lower ends coming collectively together, and in combination with the lifting bar, and a spring to automatically operate it, the supporting wings, and a lever, substantially as described.

7. The combination of the gripping fingers, lifting bar and side supporting wings, said fingers attached to the lifting bars, and having a sliding and oscillating movement on said supporting wings, substantially as described.

8. The staking tool D, provided with a col-

lar *d*, for holding the pipe on said tool, a set screw on said collar to tighten the same, a curved end to insert in the pipe, said end provided with a curved rib, and a shoulder *d*², on said tool, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ORVILLE H. LAWRENCE.
E. M. LETTS.

Witnesses:

ROSA E. TILLOTSON,
JAMES H. BOWEN.