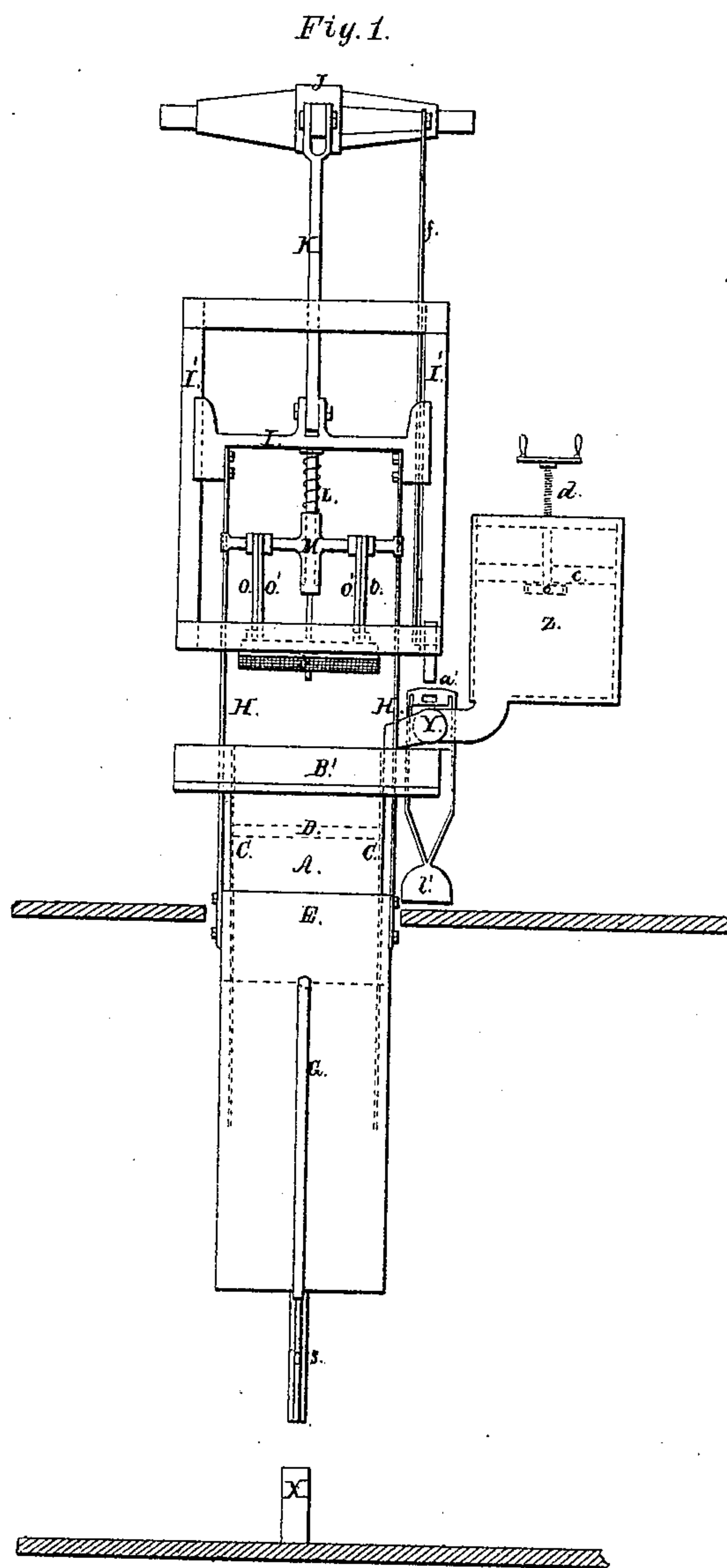


G. E. Sellers. Sheet 1 of 2 Sheets.  
 Paper Mach.  
 N<sup>o</sup> 41,102. Patented Jan. 5, 1864.



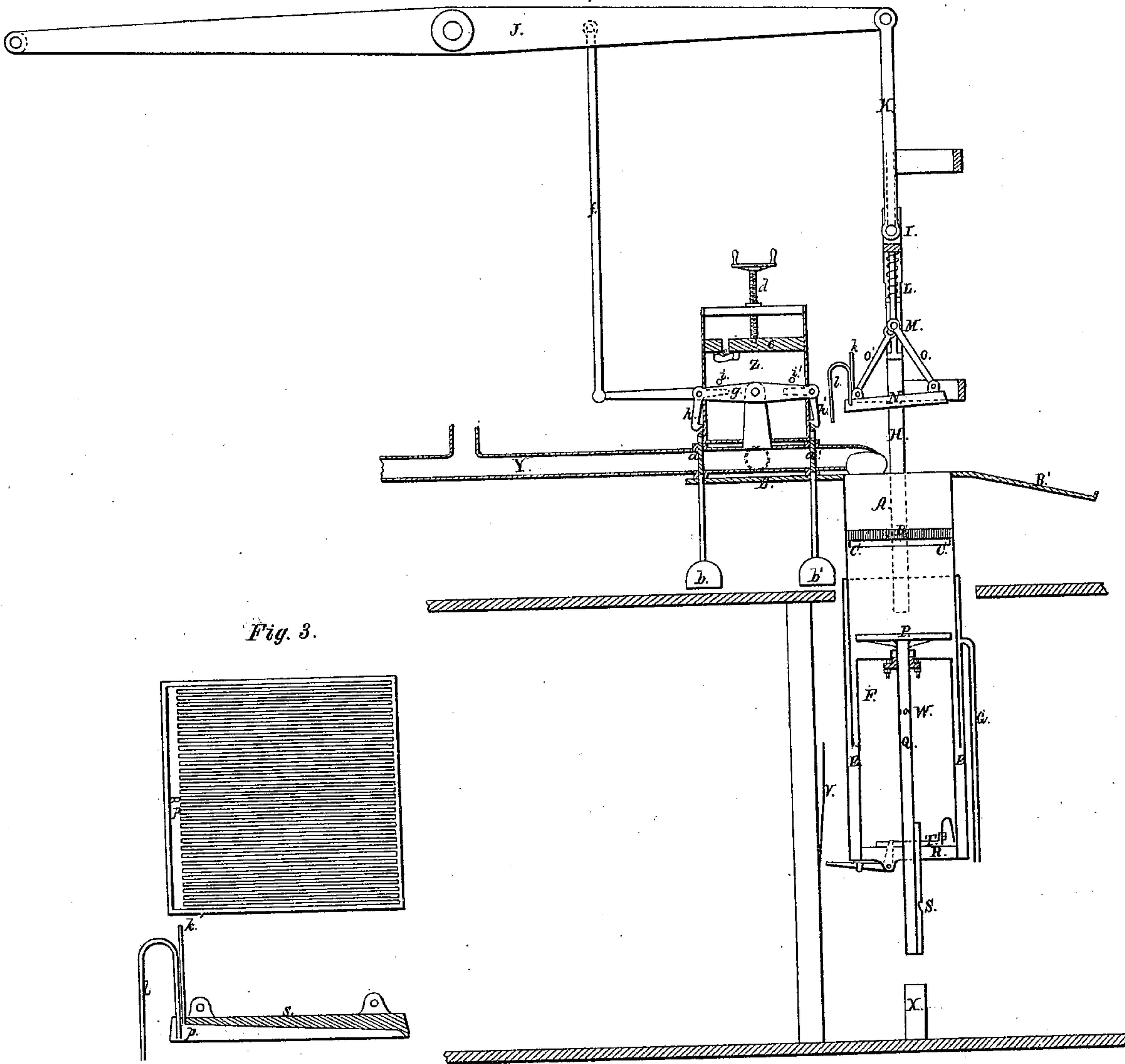
Witnesses.  
 Philip M. Price  
 William Oyle

Inventor.  
 Geo. E. Sellers

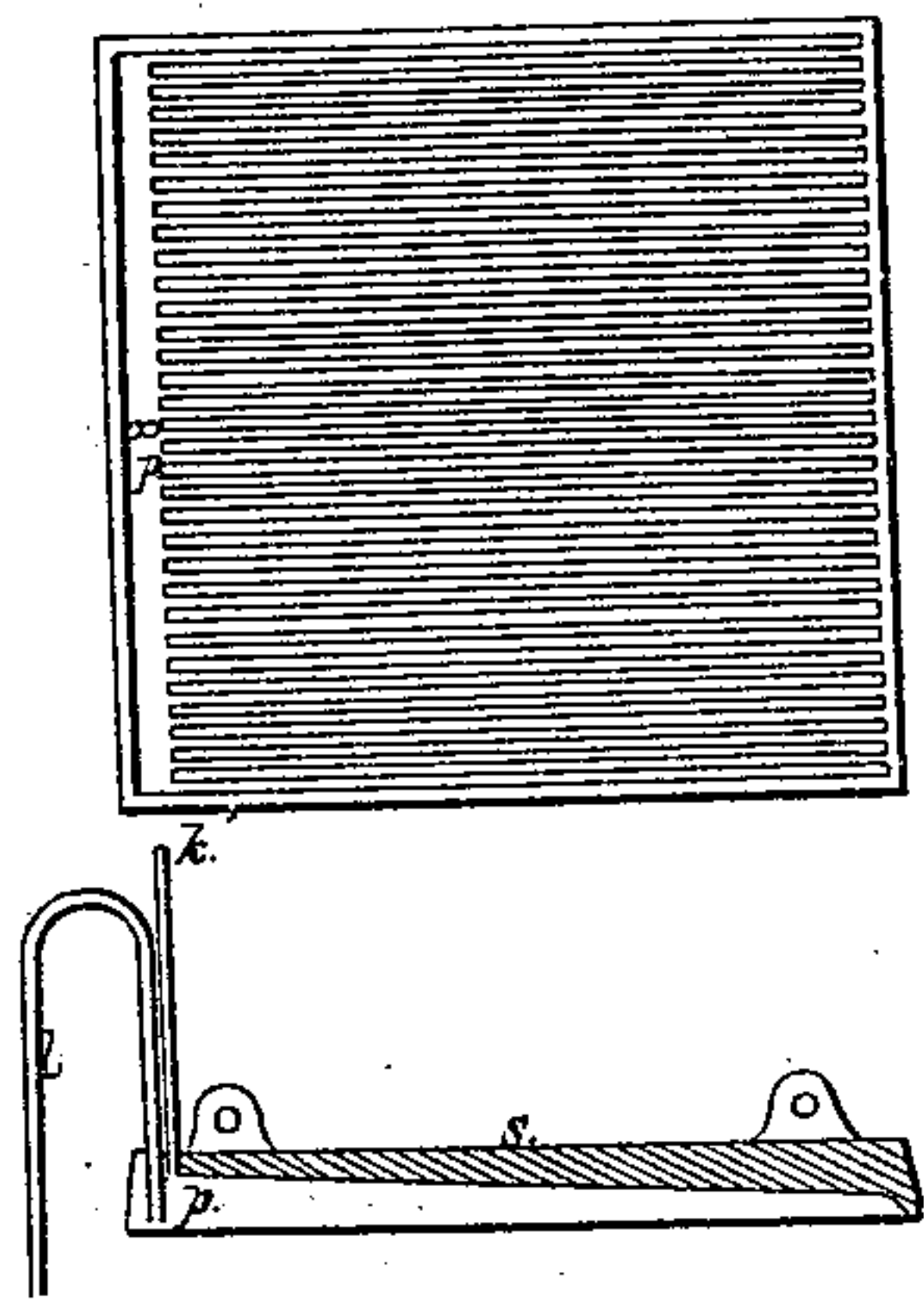
*G. E. Sellers. Sheet 2. of 2 Sheets.*  
*Paper Mach.*

*N<sup>o</sup> 41,102. Patented Jan. 5, 1864.*

*Fig. 2.*



*Fig. 3.*



*Witnesses.*  
*Philip M. Price*  
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# UNITED STATES PATENT OFFICE.

GEORGE ESCOL SELLERS, OF SELLERS' LANDING, ILLINOIS.

IMPROVEMENT IN FORMING, DRYING, AND PACKING PAPER-STOCK, &c.

Specification forming part of Letters Patent No. 41,102, dated January 5, 1864.

*to all whom it may concern:*

Be it known that I, GEORGE ESCOL SELLERS, of Sellers' Landing, Hardin county, in the State of Illinois, have invented a new and Improved Mode of Forming, Drying, and Packing for Transportation and for Use Paper Pulp or Stock; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of the specification, and to the letters of reference marked thereon.

The nature of my invention consists in extracting the water from the pulp or stock when in a mold or former by suction, then pressing the stock into a mass of sufficient tenacity to be handled, and at the same time porous enough to dry rapidly, and, after drying, to again compress and bale for transportation, so that when the stock is released from the bale-ropes or confining-bands it regains by its own elasticity sufficient porosity to be readily separated and held in suspension by water; or, when put into form for use—such as press, binders', trunk, or box boards—then by suction consolidating a layer or thickness of pulp on a mold, so as to bear a fresh layer being poured on without disturbing the first, and so on for any successive layers, and then pressing to the proper degree of solidity for the purpose required.

To enable others skilled in the art to use my invention, I will proceed to describe the mode in which I employ it, referring to the annexed drawings, making part of this specification, in which—

Figure 1 is an end elevation, Fig. 2 a side elevation, and Fig. 3 an enlarged plan and section, of the upper press-mold, similar letters having reference to similar parts in each.

A is a box former, open at both its upper and lower ends. This box is secured to the table B B', from which it is suspended, and is open through the table, the upper end of the box being level with the top of the table. It is also provided with a ledge, C C, upon which the mold D rests when in place in the box or former. The mold is an ordinary press-mold, covered on its face with wire-cloth.

E is a cistern surrounding the fixed box A, and is provided with an inner chamber, F, leaving a space between the chamber and the cistern. The object of this chamber is to les-

sen the water-space and reduce the weight when the cistern is filled with water to the overflow-pipe G. The cistern is suspended by rods H H to the cross-head I, having girders I' I'. The cross-head is connected with the walking-beam J by the connecting-rod K. Screwed into the cross-head I is a rod, L, having a nut or head at its lower end. This rod passes through another cross-head, M, having for its guides the suspension-rods H H. Around the rod L, and between the cross-heads I and M, is a spiral spring. To the cross-head M is suspended a press-mold, N, by the suspension-rods o o o' o'. Two of these suspension-rods are made to play on the cross-head by means of slotted holes, so that when the mold hangs to the cross-head the side having the rods with the slotted holes is the lowest; but when a pressure is brought on the mold by coming in contact with the stuff in the forming-box, the rods slide on the cross-head until the ends of the slots arrest them, the mold then being level.

P is a table within the box A, and secured to the upper end of a tube, Q, which tube passes through a stuffing-box in the top of the chamber F, and is guided at its lower end by the cross-bar R. The portion of this tube that slides through the cross-bar R has a feather on it in which the notch S is cut. On the cross-bar is a spring-latch, T, which is operated through the bent lever U by the spring-stop V. There are air-holes into the tube Q at W.

X is a stop for the tube Q.

Y is a tube leading from the stuff or pulp chest to the forming-box A. This tube is provided with two slide-valves, a a, to which valves are suspended the weights b b. Between these valves is an opening or tube from the tube Y into a chamber, Z. This chamber regulates the quantity of stuff to be let into the forming-box, and for that purpose is provided with a piston, c, regulated and kept in position by the screw d. This piston has an air-vent and floating valve, e. The valves a a are operated by means of the connecting-rod f from the walking-beam J, the lever g, the bent-lever latch-hooks h h, and the stops i i'. k represents an air-tube into the press-mold N, and l a siphon from the same.

The plan view in Fig. 3 represents the under side of the press-mold N, with the wire-



cloth removed, showing the grooves or waterways into the channel *p*, to convey water to the siphon *L*. *s* is a sectional view of the same.

I use a duplicate of the apparatus described attached to the other end of the walking-beam, which acts as a balance and operates alternately with it. The walking-beam has motion given to it by any motive power that will cause it to oscillate with regularity. The tube *Y* connects the stuff-chest with each regulator and forming-box. The stuff-chest must be so placed that the pulp or stuff will run into the regulating-chambers, being kept at proper consistency and agitated in the usual manner. There must also be means to keep the stuff in the chest, at or near a boiling-temperature. This I do with waste steam from the steam-washers.

Having described an apparatus such as I use, I will now proceed to explain the manner of operating with it. The drawings represent it at descending half-stroke. As the end of the walking-beam descends, and with it the cross heads, press mold, and suction-cistern, the tube *Q* comes in contact with the stop *X*, the cistern continuing to descend until the latch *T* has caught in the notch *S*, which secures the table *P* in such relative position to the cistern that on the ascending stroke the top of this table is raised to the level of the top of the table *B B'*, carrying with it the mold *D* and the stuff that is on it. When the tube *Q* is secured in position by the latch *T*, the air-vents *W* are above the stuffing-box on the top of the chamber *F*, and the air in the box *A* escapes through the tube *Q* and prevents the water of the cistern being forced out at the overflow-pipe *G*.

The drawings (at half-stroke) represent the hook-catches *h h'* as both free from the valve *a a'*. In the first part of the ascending stroke the catch *h*, having hold of the valve *a*, raises it, allowing the stuff to flow into the regulating-chamber *Z* until it is filled and the catch comes into contact with the stop *i*, which disengages it from the valve, which is then closed by the weight *b*. An operative standing at the table *B*, as soon as the table *P* is level with *B*, places the mold on it. The descending stroke then commences, the end of the latch-lever *U* being in the spring-catch *V*, disengages the supporting-tube *Q* and table *P*, which then fall and deposit the mold on its receiving edge *C C*. At the same time the valve *a'* is opened and the stuff in the regulating-chamber is discharged onto the mold in the forming-box, the valve closing by the weight *b'* when disengaged by the stop *i'*. As the cistern descends with its water surrounding the forming-box, a suction is produced that draws the water from the stuff that is on the mold, and by the time the upper press-mold comes in contact with the stuff it is almost entirely free of water. Then the spring between the cross-head acting on the press-mold squeezes the stuff or pulp into a sufficiently dense mass to bear

handling. Sometimes a small amount of water is forced into the upper press-mold, which is drawn off by the siphon as soon as it has become filled to its turn, air being admitted through the tube *k*. When in the ascending stroke the press-mold is lifted from the stuff, the arrangement of slotted holes in the rods *O' O'* causes one edge of the mold to be raised before the other, producing what paper-makers call a "couching motion," which releases the mold from the stuff without tearing it, which would be the case if the mold were lifted directly from the stuff. As soon as the bottom of the mold is level with the top of the table, the operative, being provided with a duplicate mold, slides it from the table *B* onto the table *P*, at the same time pushing the filled mold onto the end of the table *B'*, which is made on an incline, so that the charged mold slides down until arrested by a stop. Here it is taken by another operative, who turns it over onto a rack or receiver on a carriage ready to be run into the drying-room, and passes the mold back to the first operator. The cakes or blocks that have been thus formed are comparatively free from water, and are not so dense as they would have been had the same amount of water been squeezed from them, and are in a condition to be readily dried, and, being hot when formed, the drying is effected with more rapidity than if they had been made up cold. The drying-rooms are provided with ventilators for the evaporated moisture to pass off through, and are heated by stoves in the rooms.

An apparatus as described, having a former at each end of the walking-beam, making the cakes thirty inches square and about six inches thick, the beam making one oscillation per minute, will form over one ton of stuff per hour when dry, and with an attendance of four operators, including the placing in the drying-rooms.

I aim to keep the cakes as porous as possible consistent with sufficient density to bear placing in the drying-room, and to do this give a very slow motion to the apparatus to give time for the water to percolate through and out of the mass under the increased atmospheric pressure produced by the descending column of water in the forming-box below the mold, giving only a light pressure with the upper mold. When the cakes of pulp or fiber are thoroughly dried, I place them in a common packing-press, one above another, and press them to such a degree of density that they can be transported at low cost, securing them while under pressure by cords or bands, as hay or cotton is secured.

When the pulp or fiber is to be used for making paper, and the cords or bands are removed, it regains by its own elasticity so open a condition as to be readily separated and held in a state of suspension by water.

My mode of operating is well adapted to making press-boards, particularly when boards are required with their surfaces made of dif-



ferent material from their interior. For instance, a board for books may be made with a fine, soft, upper surface that will not injure the embossing-plates, with a hard, stiff interior and an under surface of great strength. For this purpose I so adjust the mold as to bring it near the top of the forming-box. I then distribute over the face of the mold a given quantity of fiber, cause the suction-cistern to descend until the fiber is sufficiently consolidated to bear a second charge being distributed over it without disturbance. For this charge I use what I have called in my patent of November 10, 1863, No. 40,576, "arundine," which is a non-fibrous substance of great hardness when dry. When the cistern has descended sufficiently to have consolidated this material, I distribute the top layer of soft fiber, which, after the water has been drawn from it, has a surface given to it by the upper press-mold. The water percolating through the successive layers, they become much more thoroughly united than when couched together in the usual manner of making boards. Some of the finer particles of arundine are carried into the lower layer of fiber, adding to its strength and hardness. By this mode any desirable thickness may be given to each layer, and non-fibrous substances, such as arundine, may be used to great advantage to give hardness and stiffness, and yet preserve a soft surface for embossing. For trunk-boards much the largest portion may be arundine, and for that purpose the boards should be dried in an oven at about 300° Fahrenheit, as heat hardens that substance.

From the above description of a machine capable of performing the uses to which I ap-

ply it, it is evident that the theory of its operation consists in the exhaustion of moisture from the wet and heated pulp or fiber by a process of exhausting, and then by an application of pressure to the mass to bring it into a condition to be handled and dried ready to pack for transportation, and in a sufficiently porous state to be readily separated and held in suspension by water; and also that the same mode of treatment enables me to arrange in consecutive layers different materials in the same mass, so as to form boards or cards of various degrees of hardness, combined with desirable qualities of surface, and which cards or boards are of use in the arts for various purposes. It is also evident that the machinery to accomplish this purpose may be made in various ways—such as the production of suction by pumps, &c.—without interfering with the theory of its operation. I therefore do not wish to limit myself to the precise form or arrangement of the machinery described, while I obtain the same result by a mode substantially the same; but

What I do claim, and desire to secure by Letters Patent, is—

1. The above-described mode of reducing paper-pulp to a condition for transportation by a system of alternate exhaustion and compression, substantially as described, and for the purpose specified.

2. The use of the same mode for the combination of pulp or fiber and other matter of various qualities for the purpose of producing boards or cards suitable for use in the arts.

GEO. ESCOL SELLERS.

Witnesses:

PHILIP M. PRICE,  
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