

(No Model.)

4 Sheets—Sheet 1.

G. K. BIRGE.

APPARATUS FOR PRINTING AND BRONZING WALL PAPER.

No. 491,303.

Patented Feb. 7, 1893.

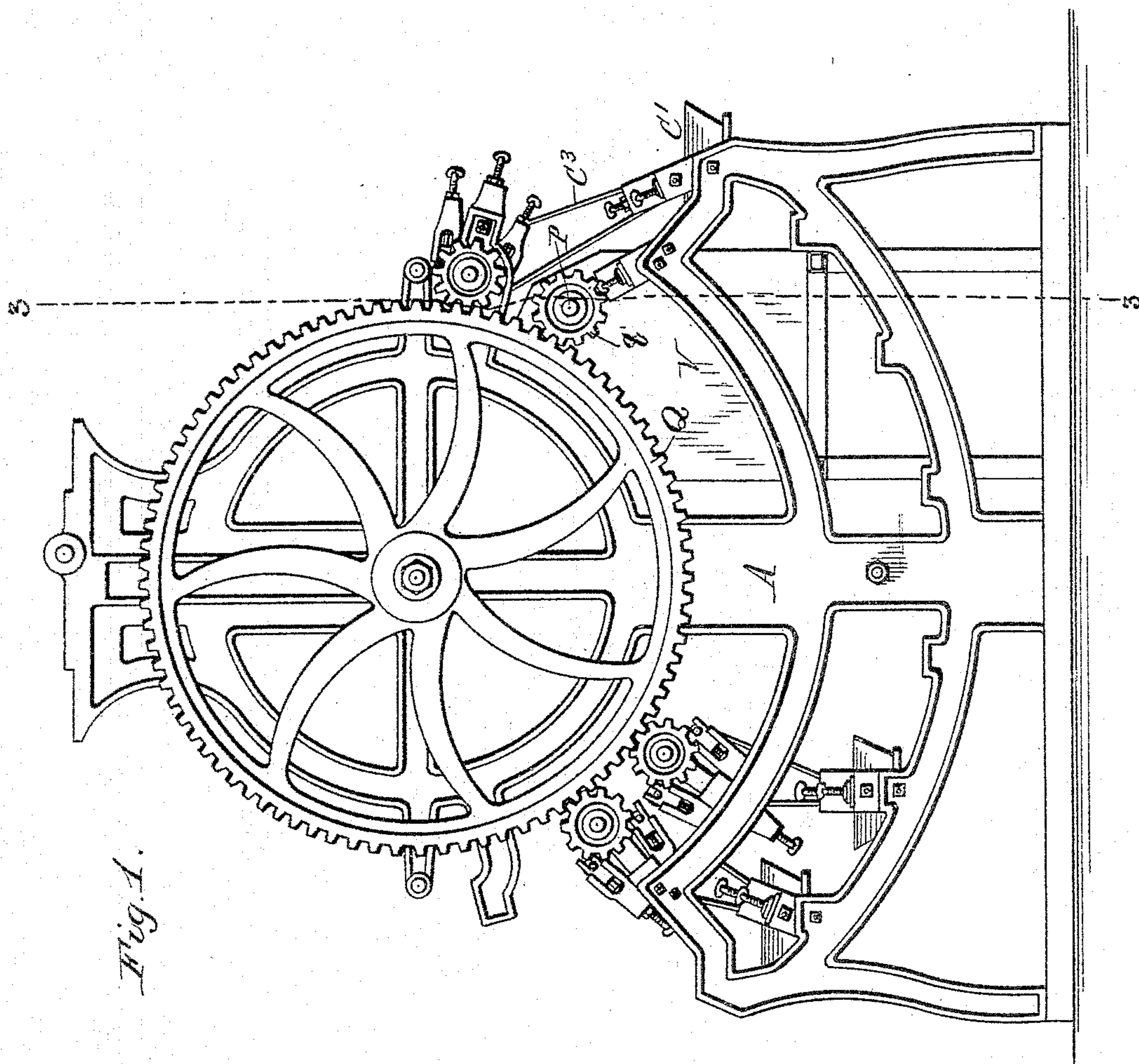


Fig. 1.

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4 Sheets—Sheet 2.

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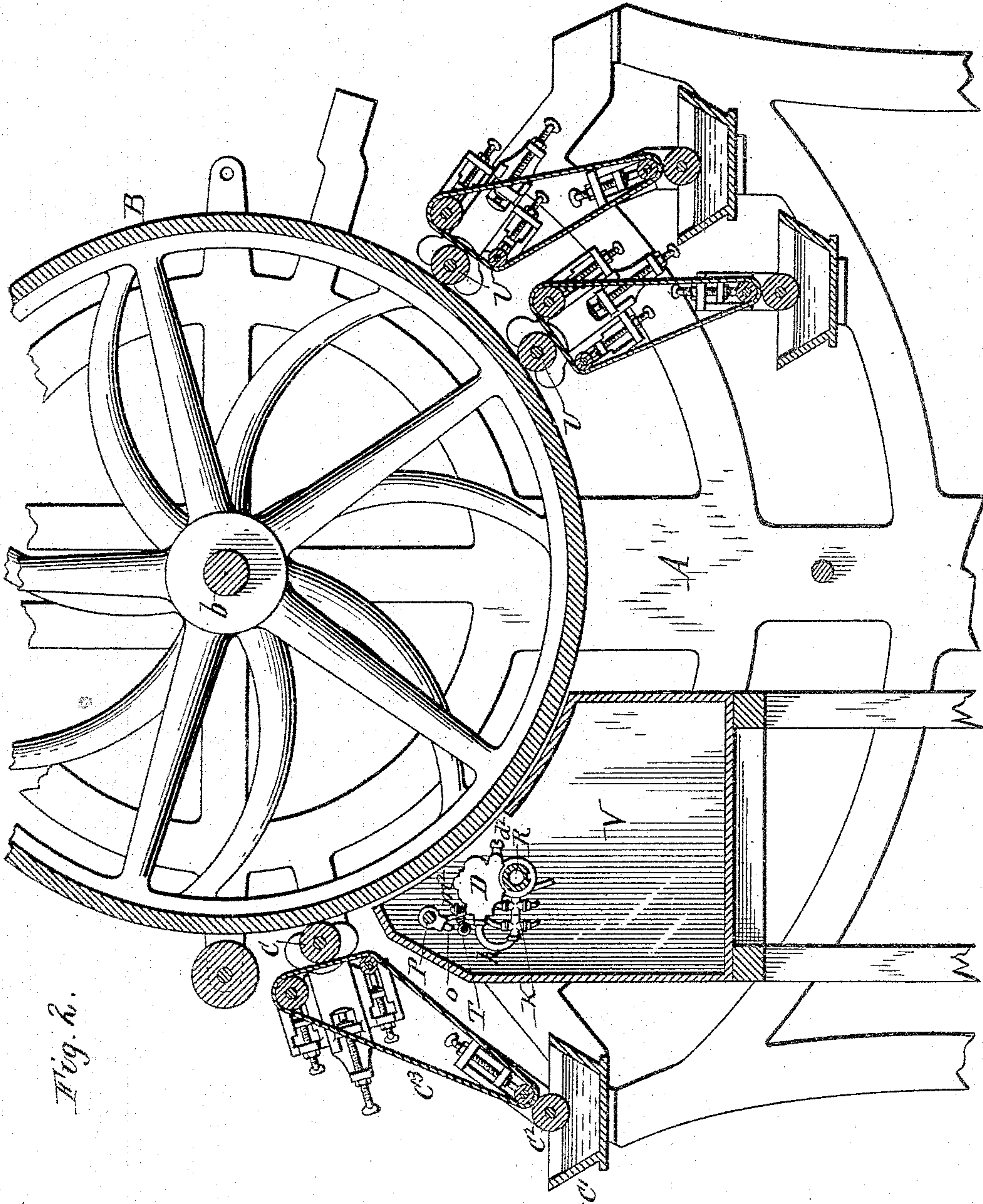


Fig. 2.

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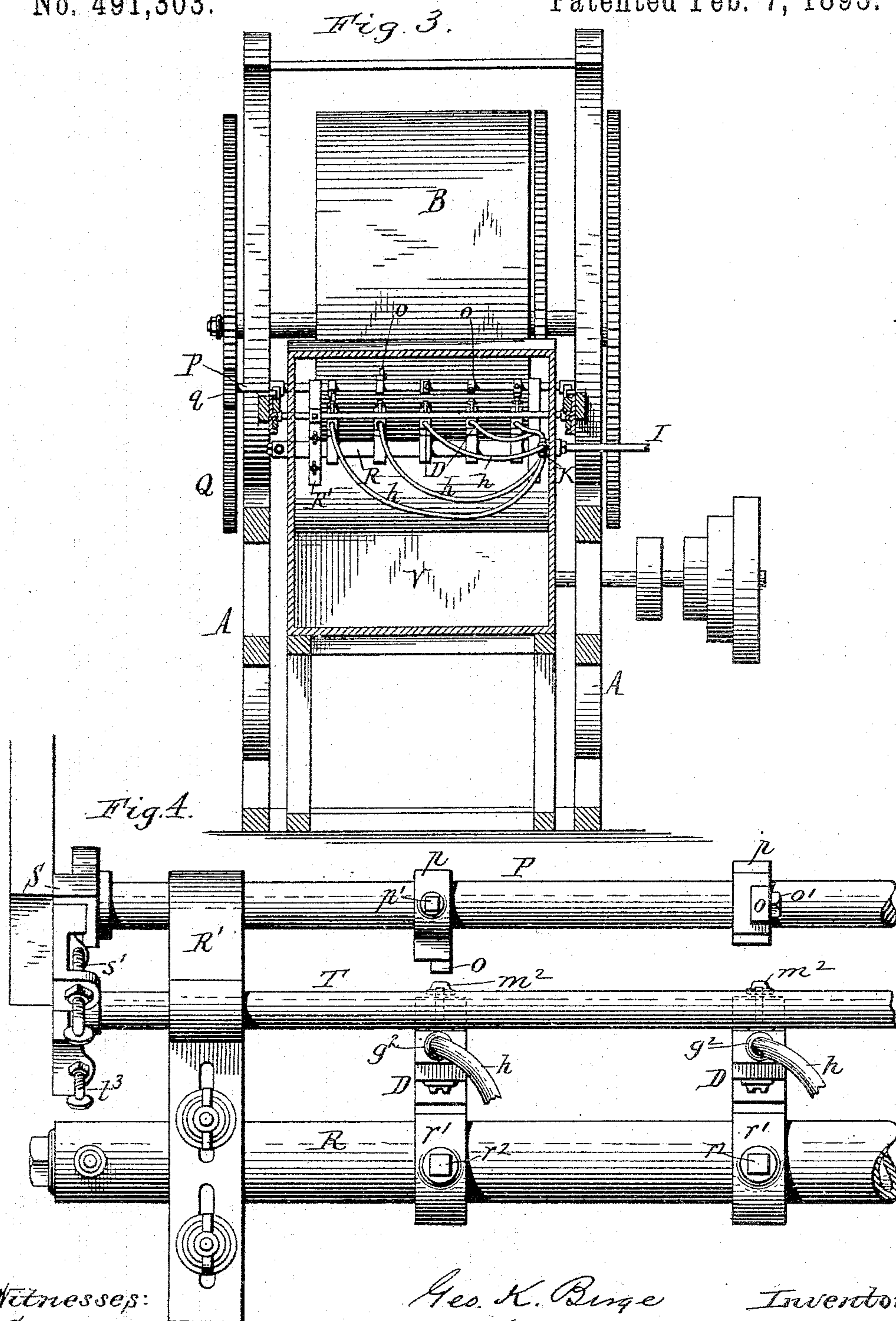


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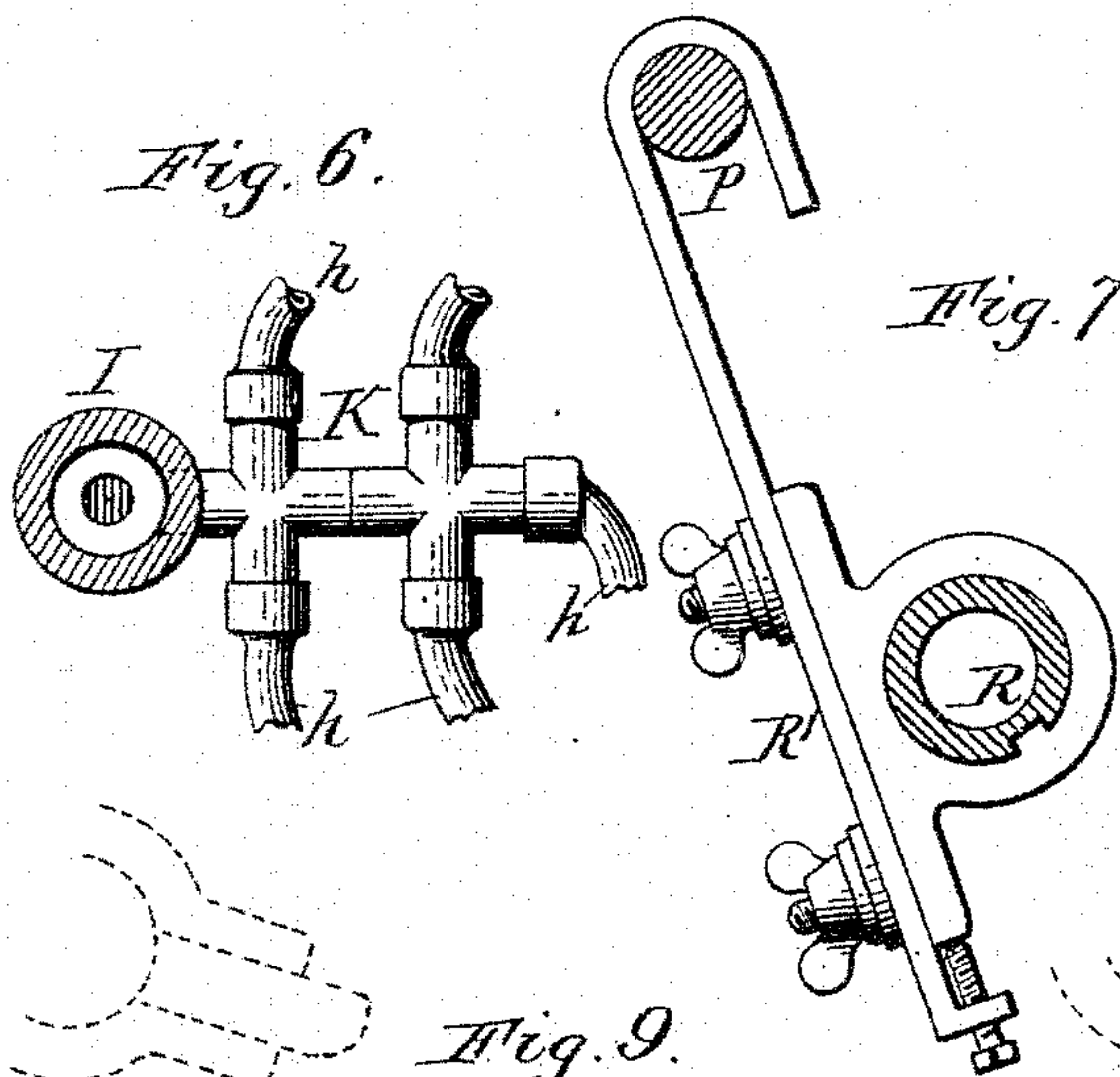
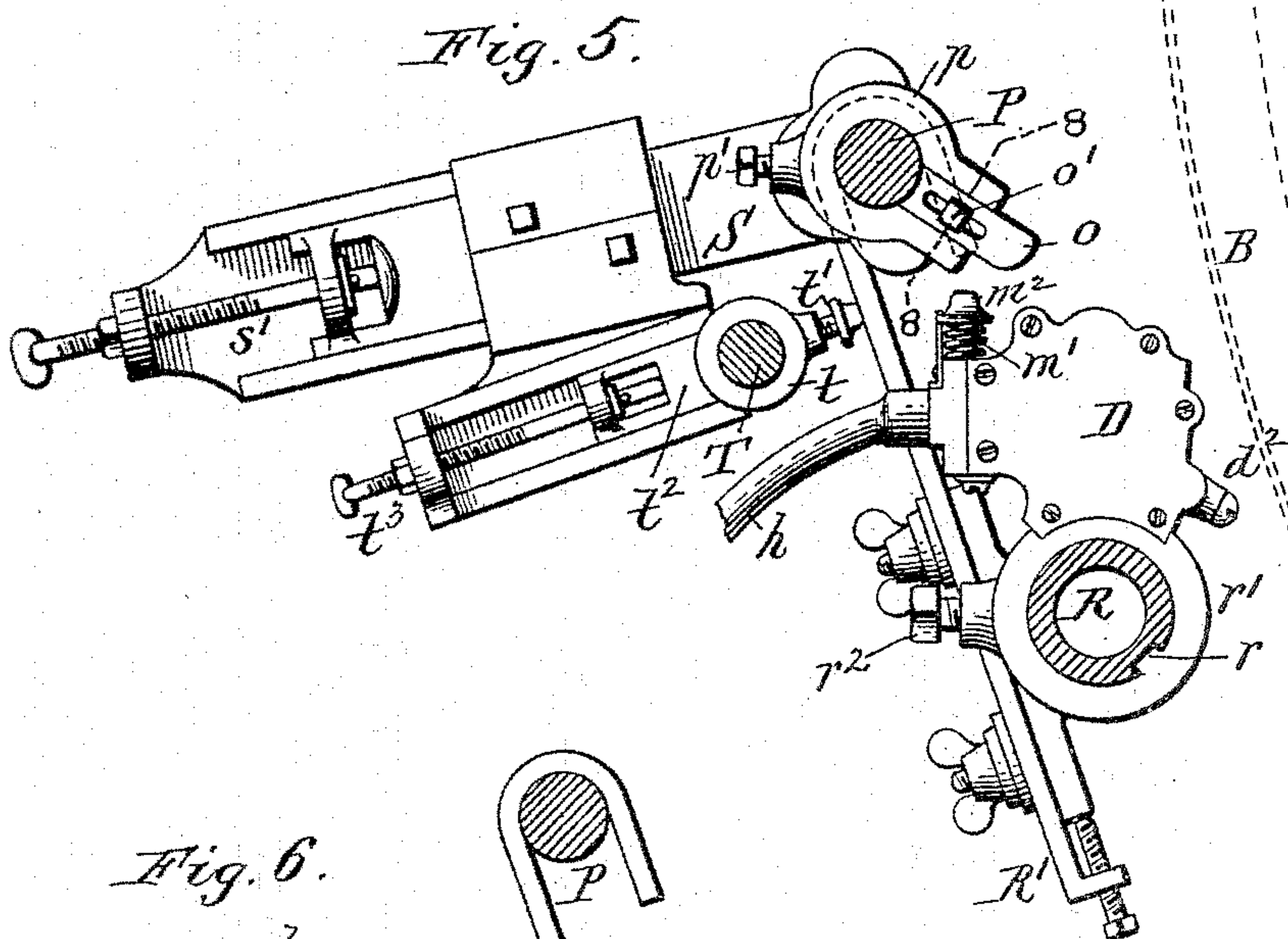
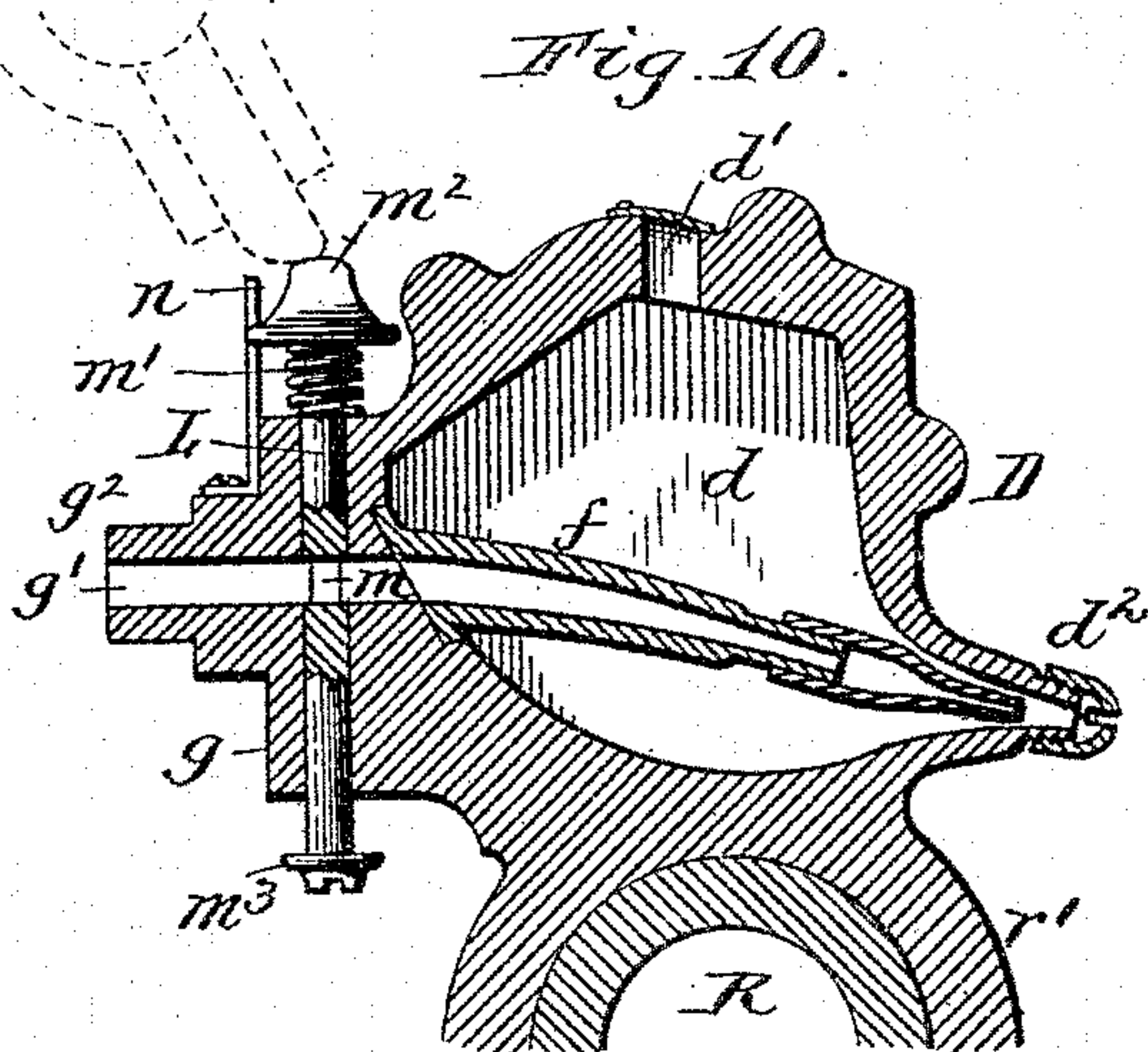
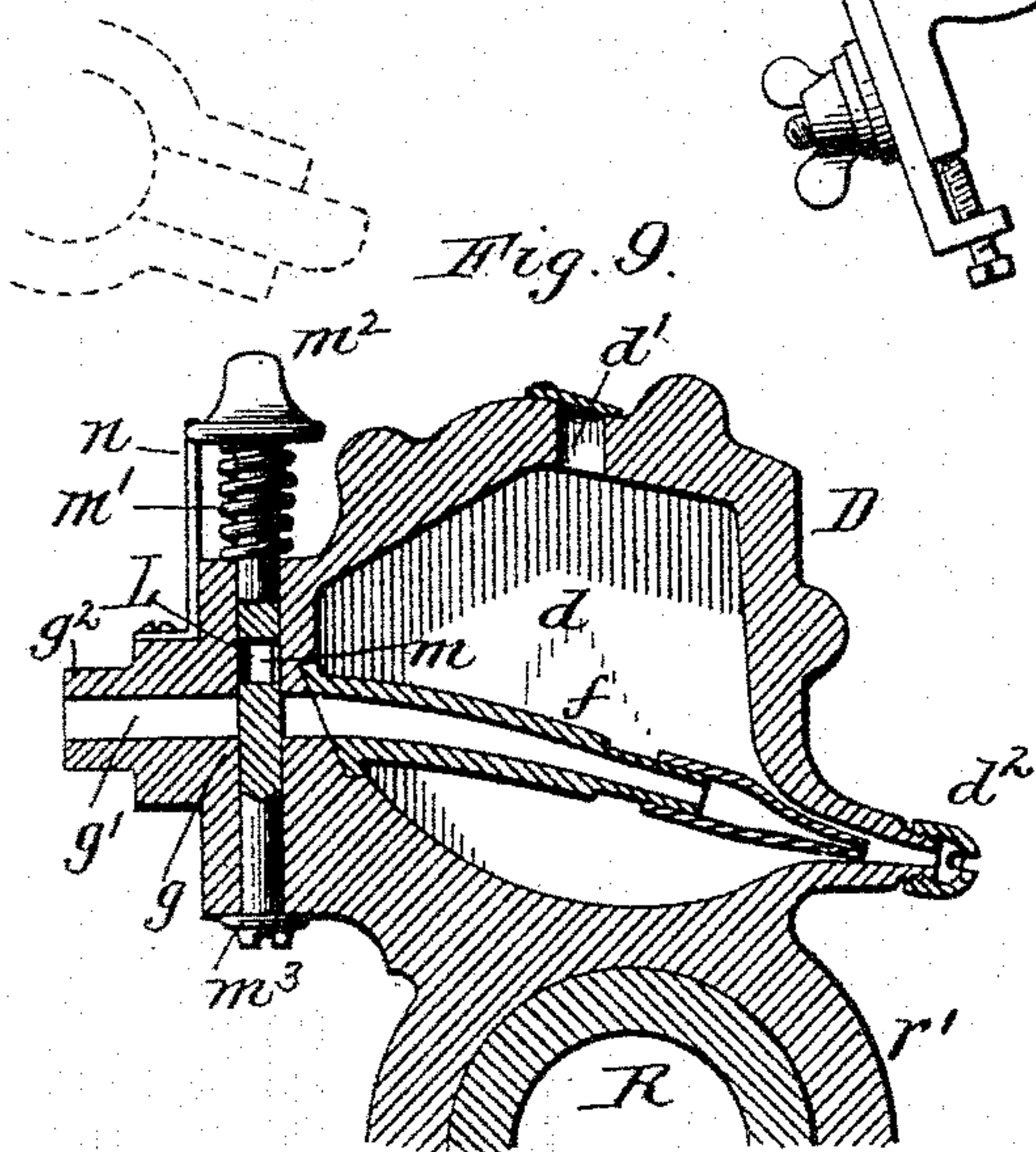
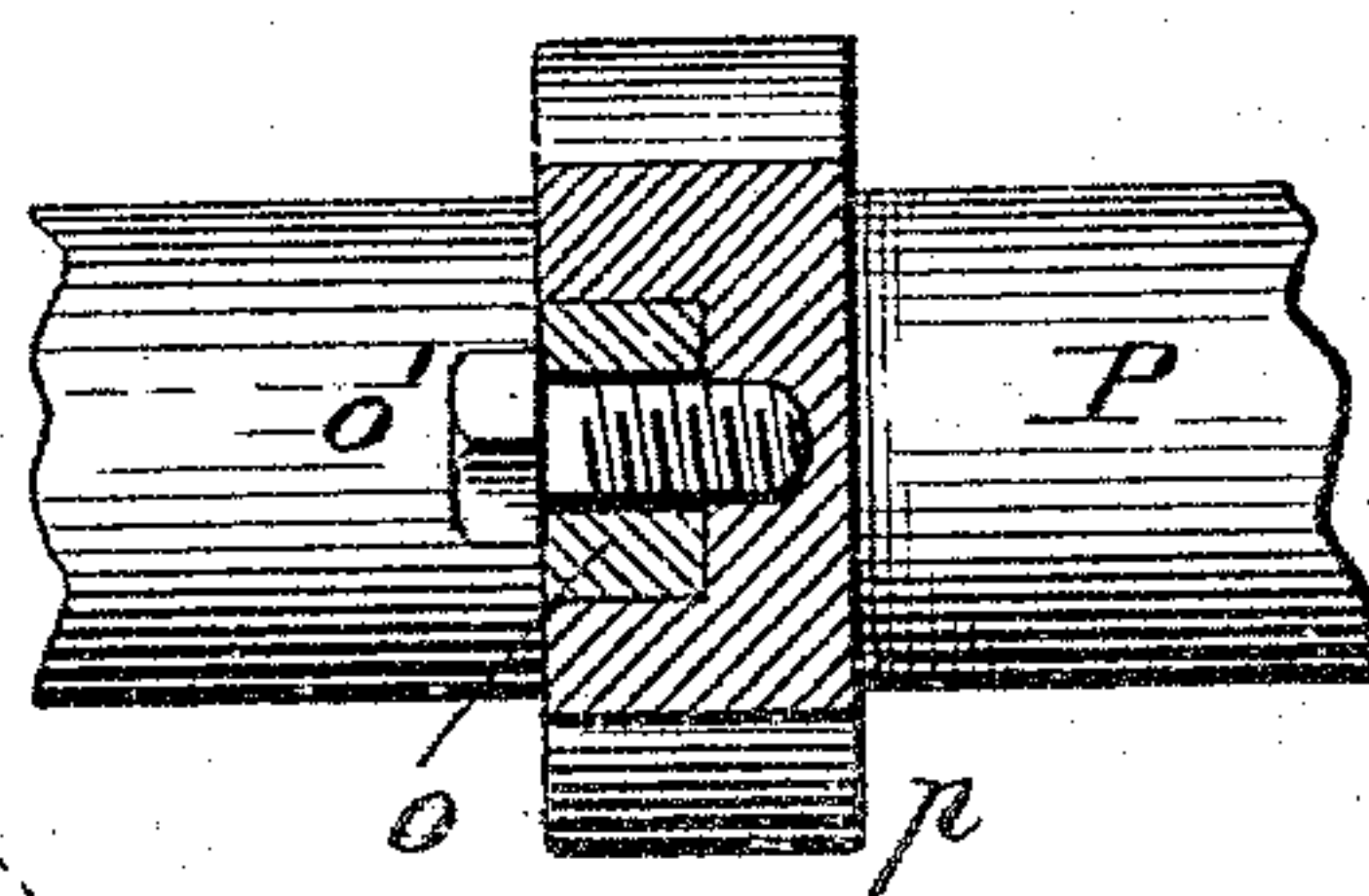


Fig. 7.

Fig. 8.



Emil Neuhart  
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Geo. K. Birge Inventor.  
By Wilhelm Bonner Attorneys.



# UNITED STATES PATENT OFFICE.

GEORGE K. BIRGE, OF BUFFALO, NEW YORK.

## APPARATUS FOR PRINTING AND BRONZING WALL-PAPER.

SPECIFICATION forming part of Letters Patent No. 491,303, dated February 7, 1893.

Application filed September 27, 1892. Serial No. 446,998. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE K. BIRGE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Apparatus for Printing and Bronzing Wall-Paper, of which the following is a specification.

This invention relates to a machine for printing wall paper with ornamental patterns which are wholly or in part executed in bronze or other similar ornamental material, for instance, mica, and has the objects to apply such material in a dry or powdered state more economically and expeditiously to the paper and to produce finer effects thereby than heretofore. These objects are attained by applying the bronze in a dry state only to those parts of the paper which have been printed with the pattern or part of the pattern which is to be executed in bronze and by doing this automatically while the paper is passing through the printing machine, instead of applying the bronze promiscuously to the entire surface of the paper by which latter method a large amount of bronze is projected against the paper without being required for the execution of the pattern.

In the accompanying drawings consisting of four sheets:—Figure 1 is a side elevation of a printing machine provided with my improvements. Fig. 2 is a longitudinal sectional elevation of the same. Fig. 3 is a vertical transverse section in line 3—3, Fig. 1. Fig. 4 is a fragmentary front view, on an enlarged scale, of several of the bronze atomizers and connecting parts. Fig. 5 is a longitudinal sectional elevation, showing one of the bronze atomizers and connecting parts on an enlarged scale. Fig. 6 is a side elevation of the manifold coupling to which the air supply tubes of the bronze atomizers are connected. Fig. 7 is a side view of one of the hangers which support the cross bar upon which the bronze atomizers are mounted. Fig. 8 is an enlarged cross section in line 8—8, Fig. 5 of one of the cams or trip fingers by which the valves of the atomizers are opened. Fig. 9 is a vertical longitudinal section of one of the bronze atomizers showing its valve closed. Fig. 10 is a similar view showing the valve open.

Like letters of reference refer to like parts in the several figures.

A represents the stationary side frames of the machine and B a rotary printing cylinder mounted upon a horizontal shaft *b* turning in bearings on the side frames of the machine.

C is a size printing roller arranged on the front side of the printing cylinder and bearing the pattern or the portion of the pattern which is to be covered with bronze. This sizing roller applies to the paper a suitable gum, size or varnish and is supplied from a fountain C' by a take-up roller C<sup>2</sup> and an endless apron C<sup>3</sup> running in contact with the sizing roller or by other suitable means.

D represents a series of atomizers which are arranged opposite the face of the printing cylinder, beyond the sizing roller, and whereby powdered bronze is delivered against the size-printed portions of the paper as the latter passes by the atomizers. Each of these atomizers is provided with a bronze chamber or receptacle *d* having in its top an inlet *d'* through which the bronze is introduced, and near its bottom a nozzle *d*<sup>2</sup> through which the blast propelling the powdered bronze is delivered. In each receptacle there is arranged a blast pipe *f* which extends forwardly into the blast nozzle *d*<sup>2</sup> of the receptacle and is separated from the inner side of the latter by an annular space or passage through which the powdered bronze is drawn into the nozzle by the blast, as shown in Figs. 9 and 10. Each bronze receptacle is formed in its rear wall with a valve case *g* through which extends rearwardly a passage *g'* forming a continuation of the blast pipe *f* and terminating in a nipple *g*<sup>2</sup>.

*h* represents a hose or flexible pipe connecting the inlet nipple of each bronze receptacle with the air supply pipe I. The latter is provided with a manifold coupling K with the branches of which the several flexible pipes are connected, as shown in Figs. 3 and 6. Compressed air is supplied to the main pipe I from an air compressor or any other suitable source.

L represents a valve arranged in the blast passage *g'* of each bronze receptacle for controlling the flow of the compressed air through the same. Each of these valves consists, preferably, of a cylindrical plug sliding in a vertical cavity of the valve casing *g* and having a transverse port *m* adapted to register with the blast passage of the case, as shown in Fig. 10.



$m'$  is a spiral spring surrounding the projecting upper portion of the valve between the upper side of the valve case  $g$  and a head  $m^2$  formed at the upper end of the valve. This  
 5 spring holds the valve in its raised position in which the coincidence between its port and the blast passage is broken, thereby preventing the flow of the air through the passage. The upward movement of the valve is  
 10 limited by a stop or collar  $m^3$  arranged at its lower end and bearing against the underside of the valve case.

$n$  is an upright guide rod secured to the bronze receptacle and entering a notch formed  
 15 in the head of the valve, whereby the latter is held against turning, but permitted to move up and down.

$o$  represents a cam or trip finger mounted upon a transverse shaft  $P$  above the head or  
 20 upper end of the valve  $L$ , and adapted to open the valve once during every rotation of the cam shaft by coming in contact with the head of the valve and depressing the same against the pressure of its spring  $m'$ . Each  
 25 of these cams is preferably made radially adjustable on the cam-shaft by means of a screw bolt  $o'$ , passing through a longitudinal slot in the cam and secured to a collar  $p$  on the shaft. This collar is adjustably secured to the cam  
 30 shaft by a set screw  $p'$ , so that upon loosening the latter, the cam can be set in any desired position with reference to the valve.

The cam shaft  $P$  is driven from the printing cylinder by a pinion  $q$  mounted on said  
 35 shaft and meshing with a gear wheel  $Q$  secured to the shaft of the printing cylinder, as shown in Figs. 1 and 3. The movement of the cams or trip fingers is so timed with reference to the printing cylinder that they open  
 40 the valves  $L$  just at the instant that the size-printed portions of the paper register with the bronze delivering nozzles  $d^2$ . The bronze atomizers are supported side by side upon a horizontal cross bar  $R$  which has preferably  
 45 the form of a pipe on which the atomizers are held against turning by feathers  $r$  entering a longitudinal groove in the pipe, as shown in Fig. 5. The bronze receptacle of each atomizer is provided with a collar  $r'$  which em-  
 50 braces this pipe and is clamped upon the same by a set screw  $r^2$  so that the atomizers can be adjusted transversely in the machine. The transverse pipe or bar  $R$  is supported near its ends by hangers  $R'$  which are hung  
 55 upon the cam shaft  $P$ .

Upon opening the valve of an atomizer by the cam the compressed air rushes through the air pipe of the bronze receptacle and draws the powered bronze into the blast nozzle and forces it through the latter and against  
 60 the paper. As soon as the cam clears the head of the valve the latter is closed by its spring, thereby stopping the passage of the compressed air and the discharge of the  
 65 bronze.

The pinion  $q$  of the cam shaft  $P$  is made re-

movable in any well known manner, so that pinions of different sizes may be applied to the shaft for turning the same the proper number of times for every rotation of the printing cylinder, as may be required by the spacing of the figures or ornaments which constitute the pattern. For this purpose the bearings of the cam shaft are made adjustable toward and from the printing cylinder, in any  
 70 suitable manner, for instance by sliding bearings  $S$  which are adjusted by screws  $s'$ . The hangers  $R'$  are supported in such a way as to hold the nozzles of the atomizers at a suitable distance from the surface of the paper and  
 75 this support is furnished by collars  $t$  attached to a cross bar  $T$ , by set screws,  $t'$ , which bear against the outside of the hangers. This cross bar is made adjustable toward and from the printing cylinder by sliding bearings  $t^2$   
 80 and adjusting screws  $t^3$  so that the cross bar and its hanger supports can be adjusted to correspond with the position of the cam shaft. Any other suitable mechanism may, however,  
 85 be employed for this purpose.

When the figures or ornaments of the bronze pattern are regularly disposed in horizontal lines, the trip cams are so adjusted as to simultaneously open the valves of all the atomizers, while when the figures of the pattern  
 90 are arranged irregularly or in echelon, as is frequently the case in floral designs, the cams are so arranged as to open the valves of alternate atomizers simultaneously, or otherwise, as may be required by the nature of the pattern.  
 95 100

After the paper has been bronzed, it may be printed if desired in colors by the usual print rollers  $U$ , which are arranged opposite the printing cylinder beyond the bronze atomizers, as shown in Fig. 2.  
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The atomizers are preferably inclosed in a box or casing  $V$  in which any surplus bronze settles and from which it may be removed from time to time.  
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In my improved machine the several bronze atomizers and the cams actuating their valves are so adjusted in the machine that the dry bronze or other powered material is blown upon the pattern printed with size as that  
 115 pattern passes the nozzles of the atomizers, so that the bronze is delivered only when a part of the paper designed to receive bronze has arrived opposite the nozzle and is practically confined to those parts of the paper which  
 120 are printed with the size pattern, whereby the bronze is economized. Since the bronze is delivered in a dry condition by a puff of air, a peculiar shaded effect of the bronze from the center to the margin of the bronze pattern  
 125 is produced which is particularly desirable in many patterns.

I claim as my invention:—

1. In a machine for ornamenting wall paper, the combination with the printing surface, of a size printing roller provided with the bronze pattern, and bronze atomizers ar-  
 130



ranged opposite said printing surface beyond the size printing roller and in register with the pattern thereof, substantially as set forth.

2. In a machine for ornamenting wall paper, the combination with the printing surface, of a size printing roller provided with the bronze pattern, bronze atomizers arranged opposite said printing surface beyond the size pattern roller, and mechanism whereby the bronze atomizers are intermittently actuated in unison with the movement of the printed bronze pattern, substantially as set forth.

3. The combination with the atomizer composed of a receptacle for the dry bronze having a delivery nozzle and a blast pipe opening into said nozzle, of a valve arranged in said blast pipe, a spring whereby said valve is closed, and a cam whereby said valve is opened, substantially as set forth.

4. The combination with the printing surface and the size printing roller provided with the bronze pattern, of bronze atomizers having blast pipes opening into their delivery nozzles, valves arranged in said blast pipes, and mechanism whereby said valves are automatically operated, substantially as set forth.

5. The combination with the printing surface and the size printing roller provided with the bronze pattern, of a series of bronze atomizers arranged opposite the printing surface beyond said roller and made individually adjustable transversely of the printing surface, and a series of cams whereby said atomizers are intermittently actuated and which are made correspondingly adjustable, substantially as set forth.

6. In a machine for printing wall paper, the combination with the printing surface, of a size printing roller provided with the bronze pattern, a series of atomizers each containing a receptacle for dry bronze, a blast pipe and a valve controlling said pipe, an air supply whereby compressed air is continuously supplied to said atomizers, and cams whereby the valves are intermittently opened and the compressed air is sent intermittently through the blast pipe of the atomizers, substantially as set forth.

7. The combination with the printing surface and the size printing roller provided with the bronze pattern, of a series of adjustable bronze atomizers, an air supply pipe provided with flexible branch pipes connecting with said atomizers, air valves arranged in said atomizers, and cams whereby said valves are actuated, substantially as set forth.

8. The combination with the printing surface, of a size printing roller provided with the bronze pattern, a cross bar arranged opposite the printing surface beyond said roller, bronze atomizers mounted on said cross bar and made laterally adjustable thereon, and a shaft provided with cams which are laterally and circumferentially adjustable and which actuate the valves of the atomizers, substantially as set forth.

Witness my hand this 24th day of September, 1892.

GEORGE K. BIRGE.

Witnesses:

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HY. D. DEE.