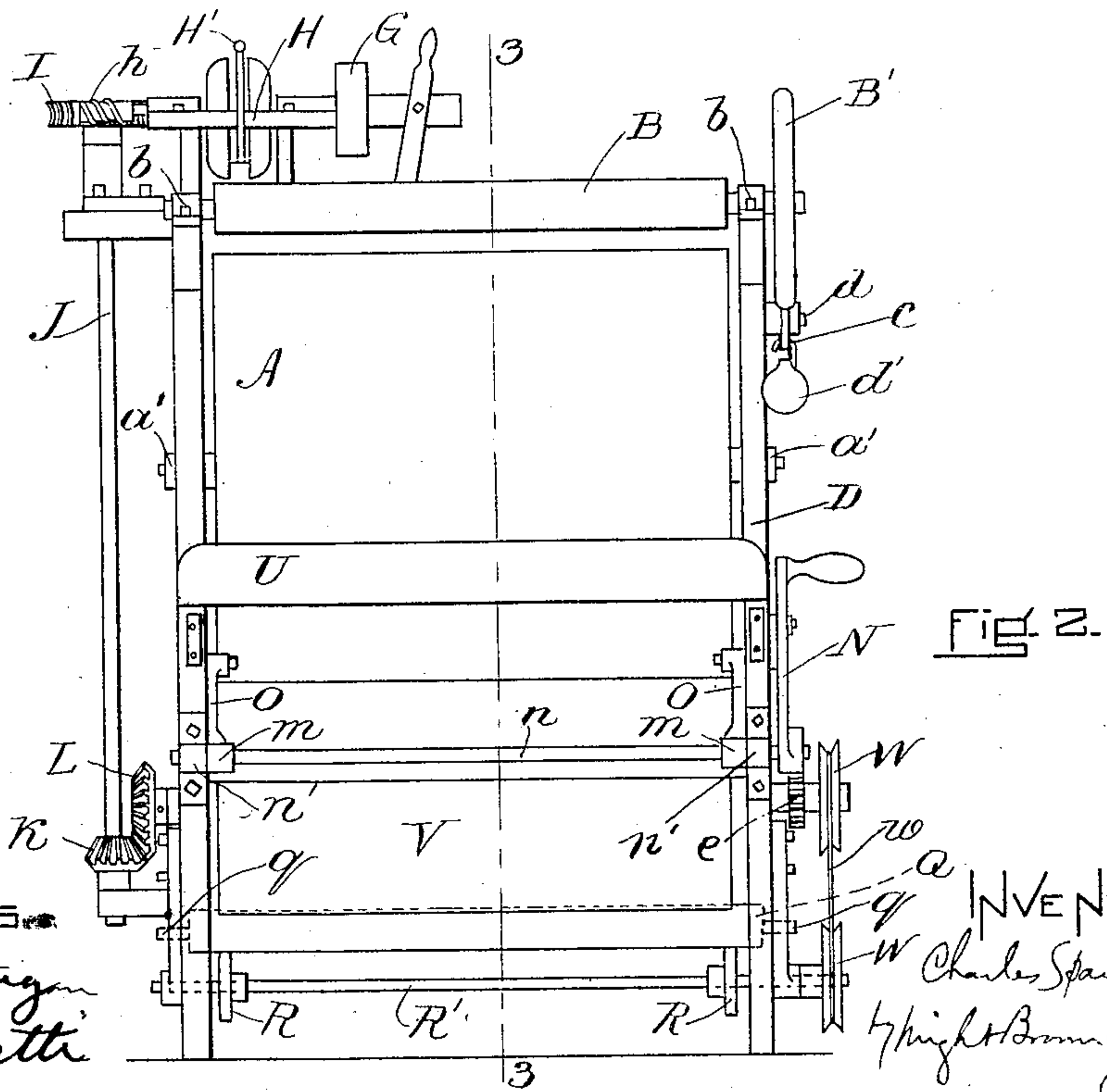
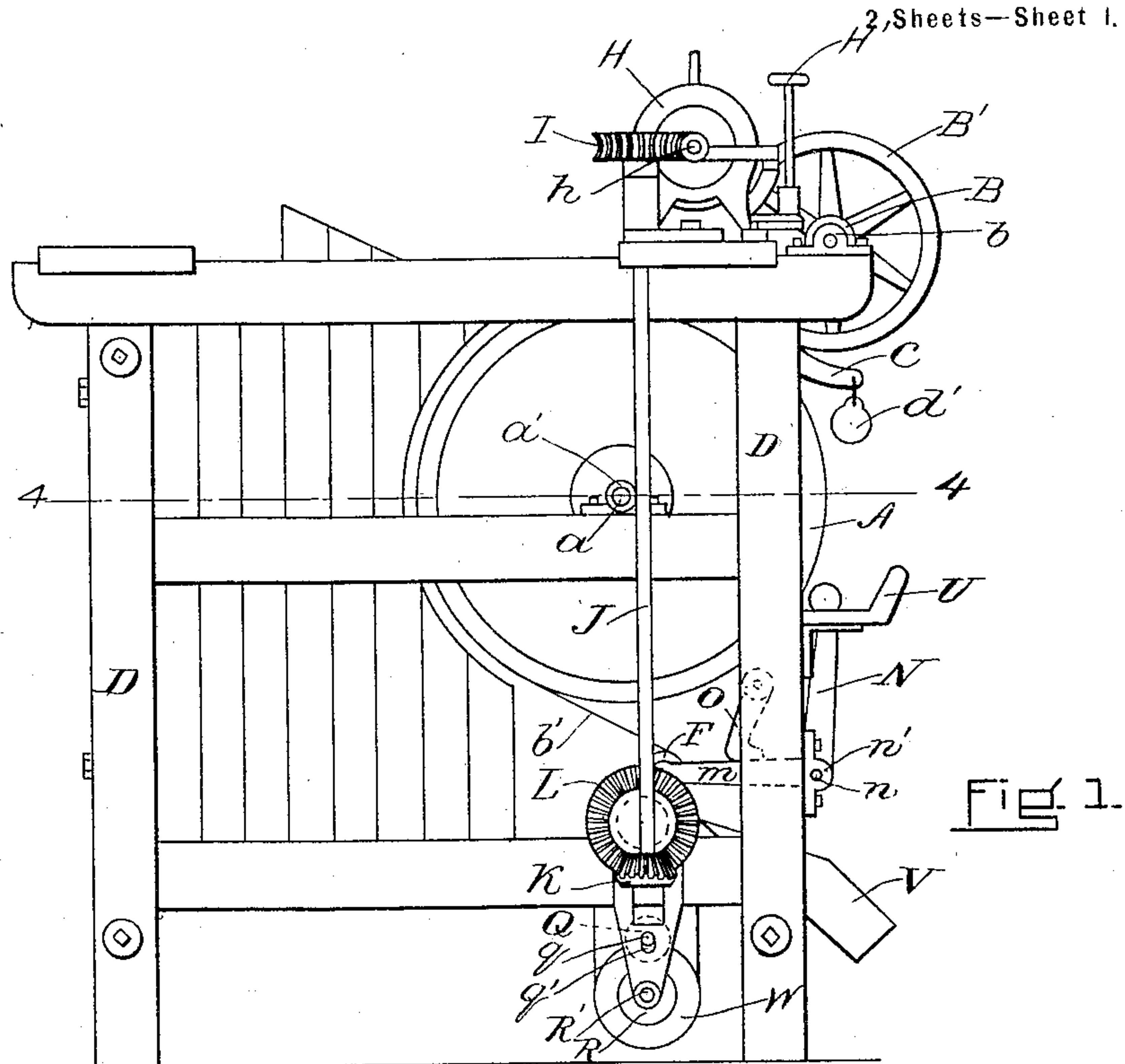


C. SPAULDING.
BLUE PRINTING MACHINE.

(Application filed Dec. 10, 1901.)

(No Model.)



WITNESSES:
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Charles Spaulding
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Att'y

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2 Sheets—Sheet 2.

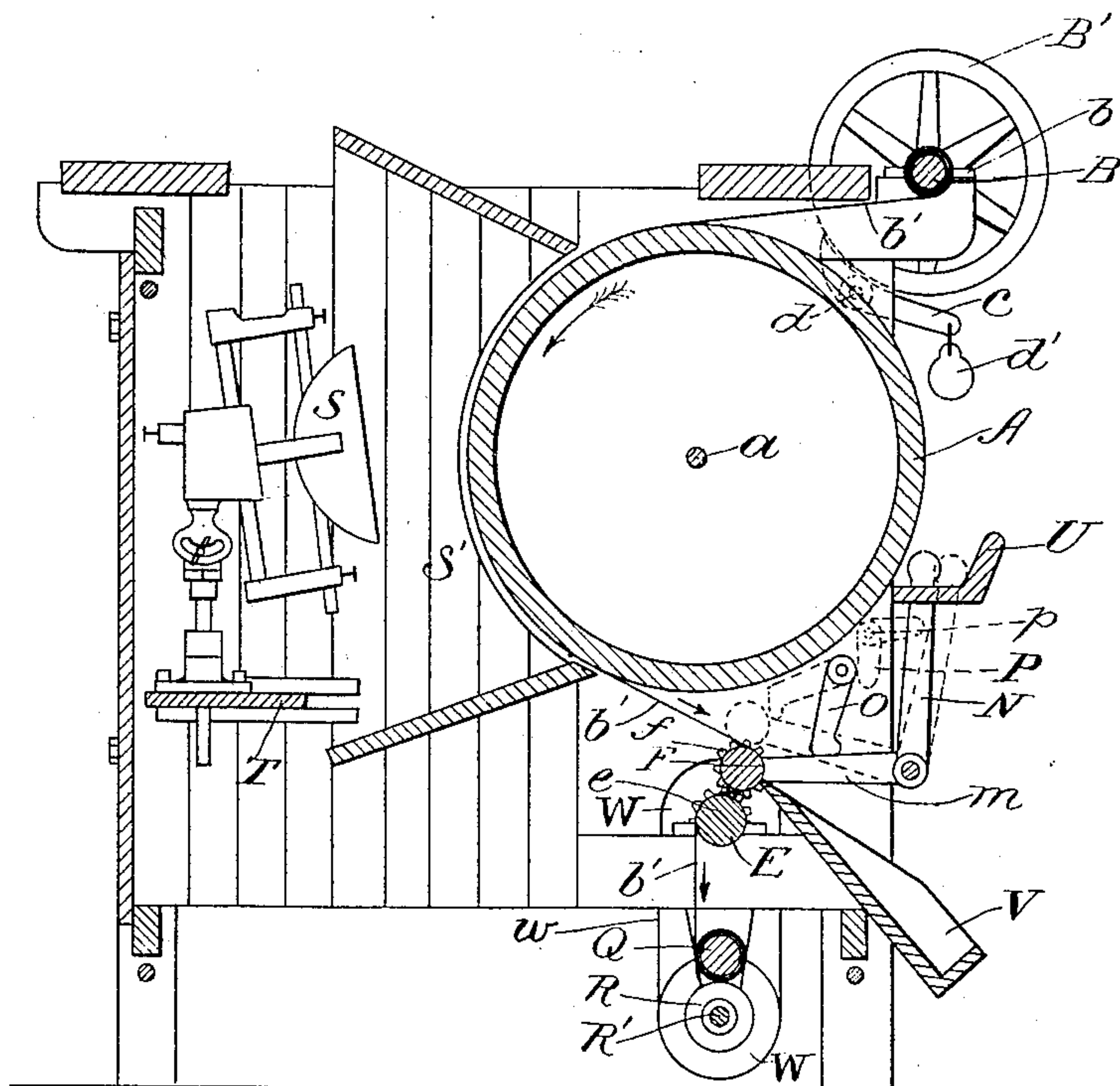


Fig. 3.

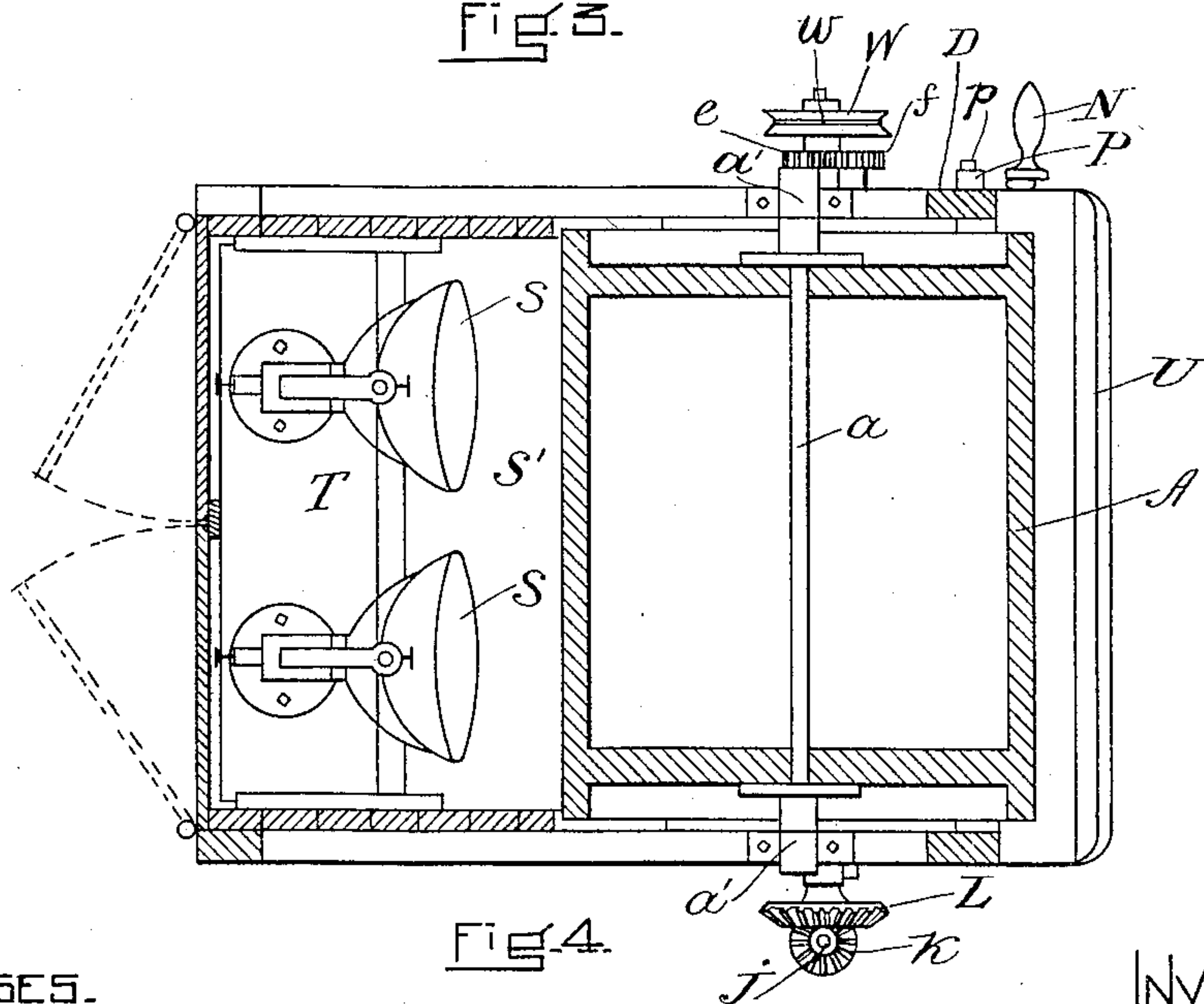


Fig. 4.

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UNITED STATES PATENT OFFICE.

CHARLES SPAULDING, OF BOSTON, MASSACHUSETTS.

BLUE-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 702,252, dated June 10, 1902.

Application filed December 10, 1901. Serial No. 85,379. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SPAULDING, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Blue-Printing Machines, of which the following is a specification.

This invention relates to photographic-printing machines, and more particularly to machines for printing from a flexible sheet, such as a sheet of tracing cloth or paper, onto a flexible sensitized sheet, such as a sheet of blue-print paper or cloth.

The objects of the invention are to save time and labor in the production of prints, to obtain improved and more uniform results, and to automatically time the exposure of the prints.

In the accompanying drawings I have illustrated a preferred embodiment of my invention, though I do not confine myself to the exact devices shown, as various modifications may be made without departing from the spirit of the invention.

Figure 1 represents a side elevation of the machine. Fig. 2 represents a front elevation. Fig. 3 represents a vertical section taken on the line 3 3 of Fig. 2. Fig. 4 represents a horizontal section taken on the line 4 4 of Fig. 1.

The same reference characters indicate the same parts in all the figures.

In the drawings, A is a cylindrical drum mounted on a shaft *a*, which rotates loosely in bearings *a' a'*, and *b'* is a flexible traveling apron made of a suitable diaphanous or light-transmitting material, such as tracing-cloth or tracing-paper, which conforms to or encircles the surface of the drum for about one-half the circumference of the latter. The surface of the drum constitutes a bed between which and the apron *b'* the flexible sheets to be printed from and the sensitized cloth or paper sheets to be printed on are held and with which they travel around half of the drum.

B is a let-off roll from which the apron *b'* unwinds, said roll being mounted to rotate in bearings *b b* and having on its shaft a hand-wheel *B'*, which answers both as a convenient means for rewinding the apron after it has

been drawn through the machine and also as a friction wheel or drum, with which coöperates a friction or brake lever *c*, pivoted at *d* to the side frame D and provided with a weight *d'*. This friction retards the rotation of the let-off roll B, and consequently puts a tension on the apron *b'* as it is drawn through the machine, which causes it to conform closely to the periphery of the drum A and to rotate said drum.

E F represent a pair of drawing or propelling rolls between and around which apron *b'* passes after it leaves the drum A, said rolls having intermeshing gears *e f*, whereby the lower roll E drives the upper roll F, the lower roll being driven by means of bevel-gears K L, a vertical shaft J having a worm-gear I and a worm *h* intermeshing therewith and rotated from a shaft on which is mounted a pulley G, belted to any convenient source of power. The power is transmitted from pulley G to worm *h* through a speed-controller H. In the particular machine which I have illustrated a handle *H'* on the speed-controller is provided, which on being turned will vary the speed transmitted from pulley G to worm *h*, and hence vary the speed of the propelling-rolls E F and the duration of the exposure. Any desired form of speed-controller may be employed.

The upper propelling-roll F is journaled in arms *m m*, attached to a rock-shaft *n*, mounted in bearings *n' n'*. To said rock-shaft is also attached an arm or handle N, whereby the shaft may be rocked and the roll F lifted away from the roll E, so as to stop the feed of the apron. To hold the rolls together with the proper feeding pressure, I provide pivoted locking-dogs O O, whose lower extremities are adapted to engage the arms *m m*, but which may be swung out of the way to allow the roll F to be elevated. For the purpose of holding said roll F in its elevated or non-feeding position I provide the dog P, pivoted at *p* and adapted to engage and hold back the handle N.

Q is a take-up roll on which the apron *b'* winds after it leaves the propelling-rolls E F, said roll Q resting by gravity on two friction-rolls R R, carried by a shaft R' and having trunnions *q q* mounted in guide-slots *q'* to allow of vertical displacement of the roll. The shaft R' has a pulley W connected by a belt

w with a similar pulley W on the shaft of the propelling-roll E, whereby the shaft R' is rotated, the speed being properly regulated, so that the slack of the apron is always taken up on the roll Q.

I do not desire to be limited to any particular form of propelling or take-up or let-off mechanism, as various devices will answer the purpose.

To provide light for printing, I have shown two electric-arc lamps S S, mounted upon a horizontally-adjustable slide or support T, whereby the intensity of the light which falls on the apron may be varied, and I have also shown a reflecting inclosure s' for the purpose of concentrating the light-rays, said inclosure also constituting a shield, which defines an area on the drum beyond which the light-rays do not penetrate to any appreciable extent. I do not limit myself to any particular means of illumination, but may use other means, such as sunlight.

A shelf or trough U is provided in front of the drum A for supporting the sensitized sheets or rolls and the tracings or other sheets to be printed from, and an inclined shelf or receptacle V is provided below the propelling-roll F, into which the printing-sheets and prints may drop after exposure.

The operation of the machine is as follows: A sheet of sensitized paper or cloth and the sheet to be printed from are placed together in the proper relation and inserted in the space formed by the convergence of the drum A and the apron b' at the upper side of the drum. They are carried around between the apron and drum and printed by the light from the lamps S, which shines through the diaphanous material of the apron, the length of the exposure being predetermined by the speed of travel of the apron, which is regulated through the speed-controller H. After exposure the prints and printing-sheets drop onto the shelf V, being automatically liberated or discharged when they reach the space formed by the divergence of the apron and drum on the lower side of the latter. The length of print which may be exposed is limited only by the length of the apron b', and any width of print within the width of the apron and drum may be made. Also any and all sizes within its capacity can be fed to the machine without the delay usually caused in devices heretofore used in photographic printing. After the available length of apron b' has been drawn through the machine the roll F is held away from roll E and the apron is rewound on roll B.

I am aware that drums have been used as a means of exposing drawings and sensitized paper to the action of light and said drums revolved to expose all parts of their circumference to the source of the rays; but the method of using such drums has been to attach the drawings and sensitized paper se-

curely to the surface of the drum by tacks or spring-clamps. This method not only requires a great deal of time to prepare for the exposure, but produces in many cases blurred prints, due to imperfect contact between the drawings and sensitized paper, which I overcome by the tension of a diaphanous apron uniformly pressing against that portion of the drum exposed to the action of the light. I do not, therefore, broadly claim a rotary drum for photographic printing, nor, on the contrary, do I wholly limit myself to the use of a rotary drum as the coöperative bed element.

Although the preferred method of using the machine is that which I have described, wherein the apron b' is left blank and the drawings and sensitized sheets placed between the apron and drum, it is obvious that the drawing itself might be executed directly on the apron b'. The principal novelty and usefulness of my invention over prior devices, however, lies in the construction and arrangement of the bed and diaphanous apron whereby the sheets to be printed from and the sensitized sheets may be inserted at one point and discharged at another point.

I claim—

1. In a photographic-printing machine, a diaphanous flexible traveling apron, and a coincidently-traveling bed, the two having a contacting zone and being separated on both sides of said zone to receive and discharge the work.

2. In a photographic-printing machine, a rotary drum and a coincidently-traveling diaphanous flexible apron partially encircling said drum and separating therefrom on both sides of the zone of contact for the purpose of receiving and discharging the work.

3. In a photographic-printing machine, a diaphanous flexible traveling apron, a coincidently-traveling bed, the two having a contacting zone and being separated on both sides of said zone to receive and discharge the work, and rolls attached to both ends of said apron and on which the latter may be alternately wound and unwound.

4. In a photographic-printing machine, a diaphanous flexible traveling apron, a coincidently-traveling bed, the two having a contacting zone and being separated on both sides of said zone to receive and discharge the work, a let-off mechanism connected with one end of the work and having provisions for frictionally retarding the release of the apron, an automatic take-up mechanism connected with the other end of the apron, and separable feed-rolls located between the contacting zone and said take-up mechanism for propelling said apron.

CHARLES SPAULDING.

Witnesses:

CHARLES S. WEEKS,
HENRY B. P. ASHCROFT.