(No Model.)

4 Sheets—Sheet 1.

F. W. HAYWARD, A. S. KING & A. W. LOVELAND.

APPARATUS FOR COATING PAPER, &c.

No. 504,215. Patented Aug. 29, 1893.

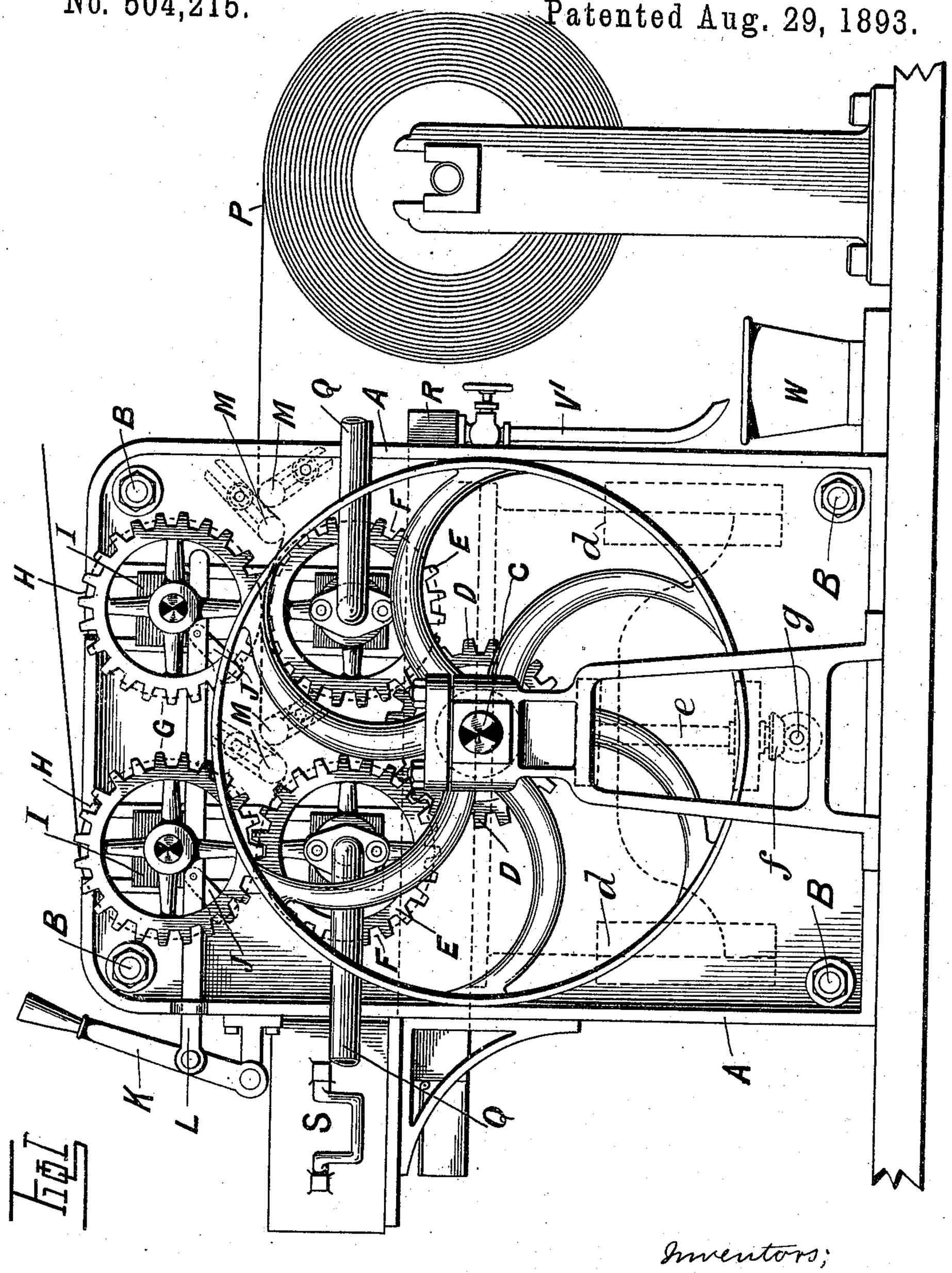


FIG. 1.

Witnesses;
G. W. Rea
Thos. A. Lyon

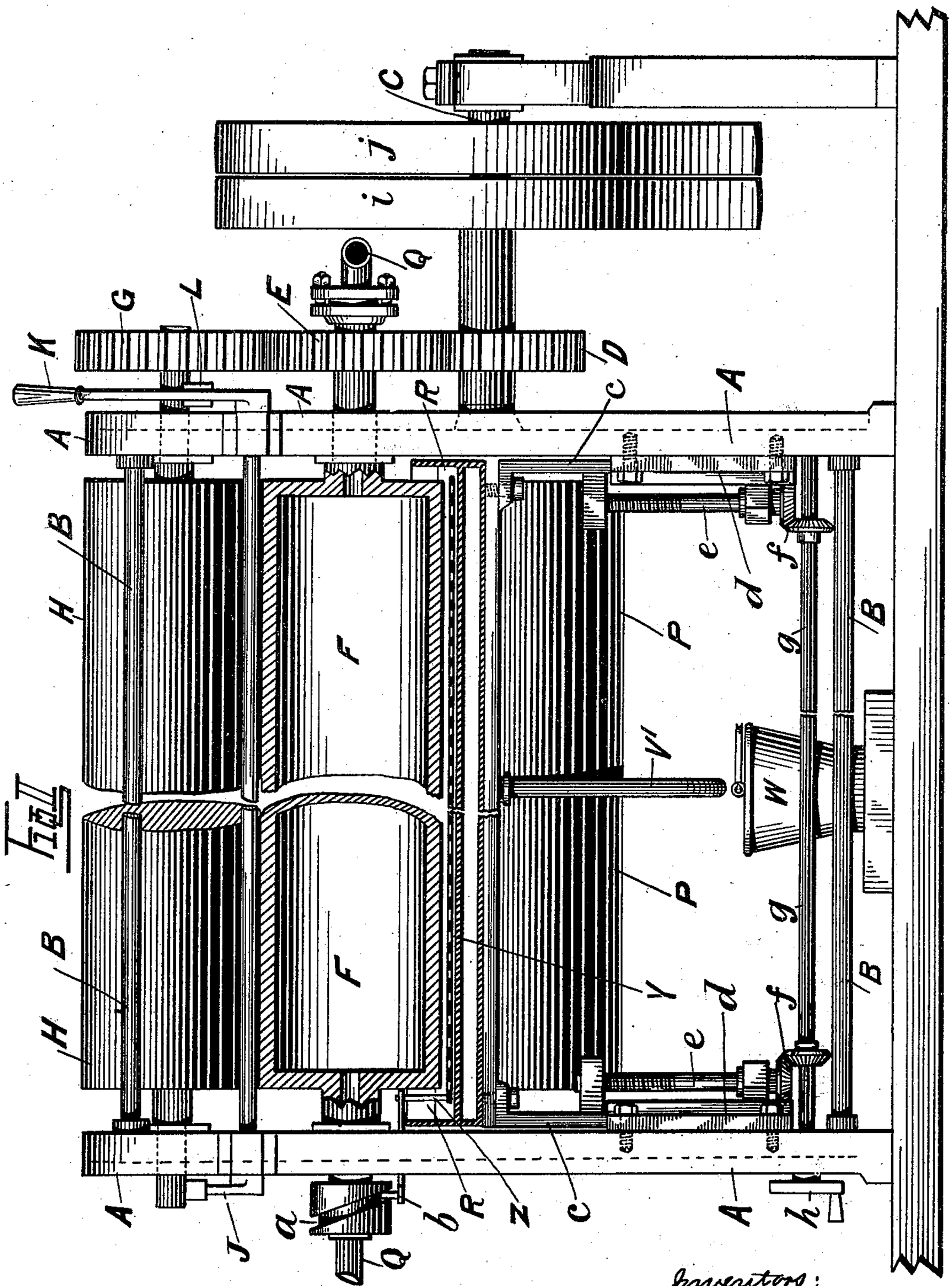
Inventors;
Frank W. Hayward
Alfred S. King and
Alfred W. Loveland
By James L. Norris
Atty.

(No Model.) 4 Sheets—Sheet 2.

F. W. HAYWARD, A. S. KING & A. W. LOVELAND.

APPARATUS FOR COATING PAPER, &c.

No. 504,215. Patented Aug. 29, 1893.



Witnesses:
G. W. Rea.
Thos. A. Green

Inventors;
Frank W. Hayward
Alfred S. King and
Alfred W. Loveland,
By James L. Norris
Atty.

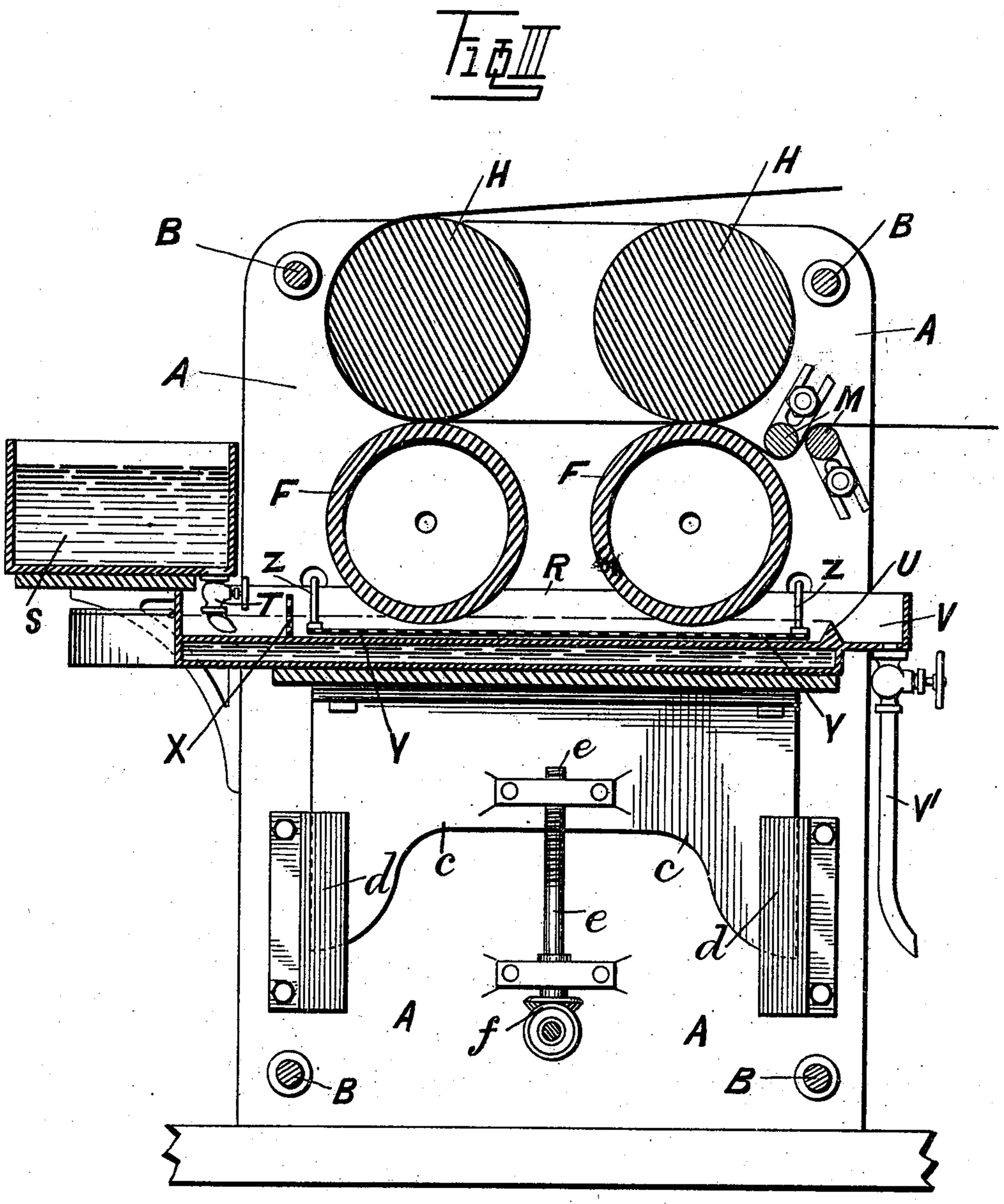
(No Model.) 4 Sheets—Sheet 3.

F. W. HAYWARD, A. S. KING & A. W. LOVELAND.

APPARATUS FOR COATING PAPER, &c.

No. 504,215. Patented Aug. 29, 1893.

Fig III



Witnesses;
G. W. Rea.
Thos. A. Green

Inventors:
Frank W. Hayward,
Alfred S. King, and
Alfred W. Loveland
By James L. Norris
Atty.

(No Model.) 4 Sheets—Sheet 4.

F. W. HAYWARD, A. S. KING & A. W. LOVELAND.

APPARATUS FOR COATING PAPER, &c.

No. 504,215. Patented Aug. 29, 1893.

Fig. II

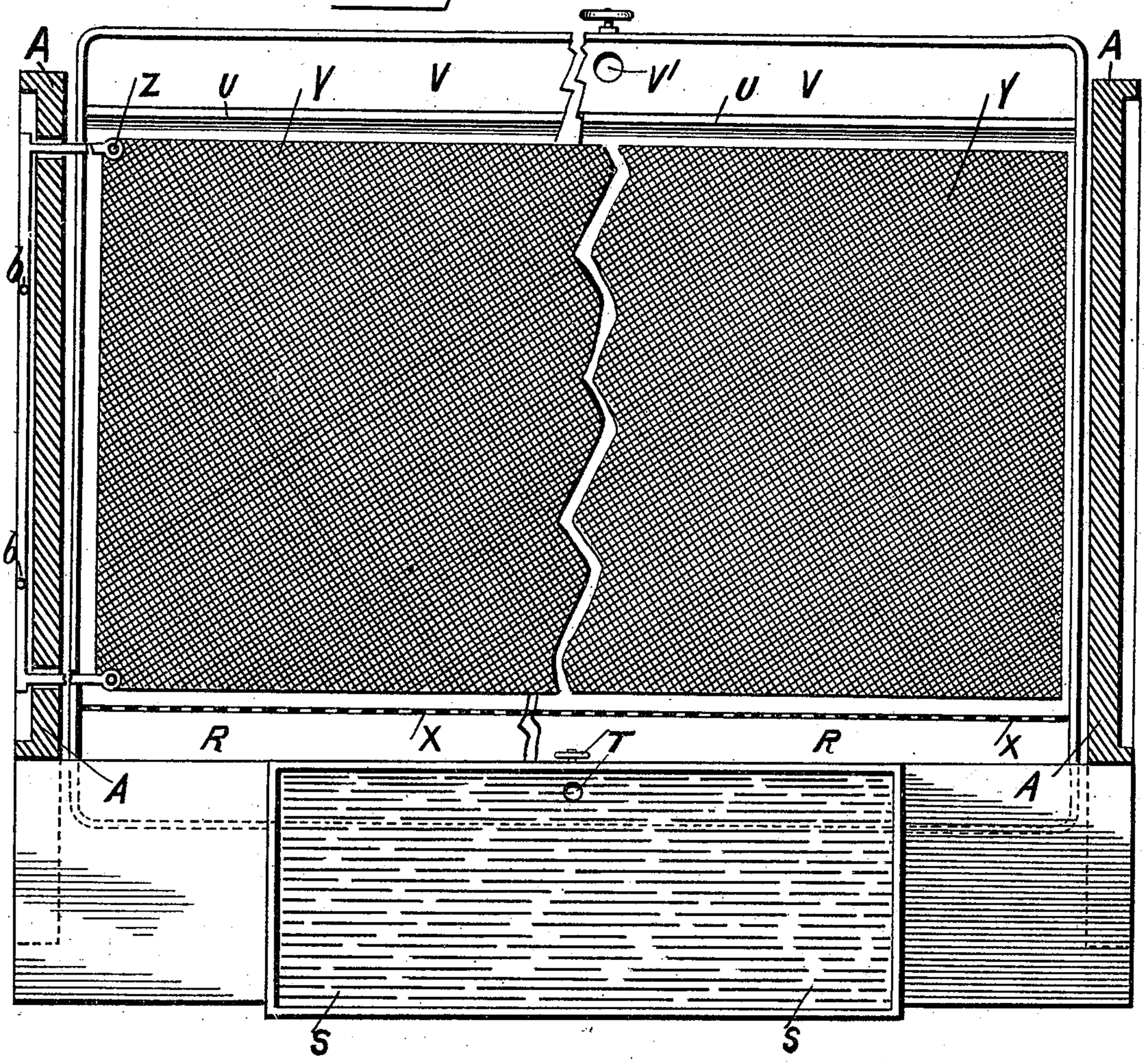
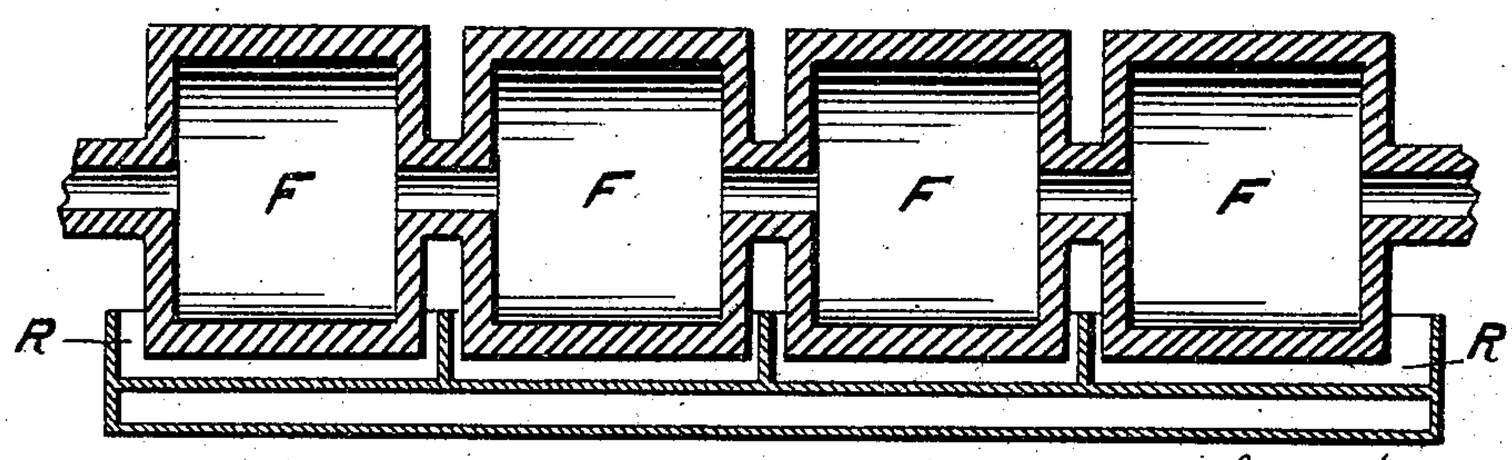


Fig. V



Witnesses:
G. W. Rea,
Thos. A. Green

Inventors:
Frank W. Hayward
Alfred S. King and
Alfred W. Loveland,
By James L. Norris
Atty.

UNITED STATES PATENT OFFICE.

FRANK WALTER HAYWARD, ALFRED STEPHEN KING, AND ALFRED WOODBRIDGE LOVELAND, OF NORWICH, ENGLAND.

APPARATUS FOR COATING PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 504,215, dated August 29, 1893.

Application filed April 27, 1893. Serial No. 472,125. (No model.) Patented in England November 28, 1892, No. 21,714.

To all whom it may concern:

Be it known that we, FRANK WALTER HAYWARD, ALFRED STEPHEN KING, and ALFRED WOODBRIDGE LOVELAND, subjects of the Queen of Great Britain, residing at Norwich, in the county of Norfolk, England, have invented certain new and useful Improvements in Apparatus for Coating Paper or other Material with Color, Gum, Oil, Varnish, or the Like, (patented in Great Britain on the 28th day of November, 1892, No. 21,714,) of which the following is a specification.

This invention relates to improved apparatus for uniformly coating the surface of paper or other material with a liquid body, such as color, gum, oil or varnish.

The apparatus consists of a frame in which the color or other liquid agent reservoir is placed beneath one or more chased, striated or indented surface rolls which dip more or less slightly into the agent and by rotation carry a superabundant supply of the agent and press it on the surface of the paper or other material which is drawn over and in contact therewith by the nip pressure of an upper roller or rollers which may be covered with an elastic material or carry a continual flexible band of uniform substance and thickness but so as to preserve the uniformity and effectiveness of the pressure of the uncovered roll, said roller or rollers being geared and or by the friction of the under roller or rollers when without gearing to revolve at the same speed as the chased or striated roller or rollers to impart an equal strain upon the paper and maintain its level passage through between the rolls. The chased or other faced roll or rollers carry the agent to the nip of the rollers in the front of which the surplus forms into a flood, which dampens the surface of the paper so that although at the nip of the rolls the quantity of the agent is limited by that compressed in the chases, yet immediately the material passes from the nip, the agent by reason of the surface of the material having been wet, blends by capillary attraction aided by the wet into one uniform coat. This surplus flood in front of the nip also insures a full and compressed charge of the agent to all the crevices on reaching the point where the nip occurs.

The color trough or reservoir is provided with an agitator which insures a constant tone of color for the chased or striated roller or rollers to take up and the reservoir is provided with a strainer and an overflow trough, the gate of which enables the level of the liquid to be permanent the strainer keeping back air bubbles. The agitator has a very slow motion so as not to create bubbles and as it is in the form of a wire mesh or perforated sheet the heavy ingredients are thereby kept in suspension.

The reservoir is capable of adjustment as to height by screw and pinion gearing and the nip of the rollers is governed by the weight of the top roller or rollers which may be increased by weights or springs on the bearings but as it is not rigidly fixed it is thereby self adjusting to the substance of the material passing between.

The reservoir is fitted upon a water vessel which can be heated by gas flame and the chased or striated roll or rolls of hollow formation can have steam or hot water passed through them should heat be required to prevent the coating agent coagulating or becoming stiff.

If narrow paper or cloth be passed through the machine the roll or rolls can be in sections to dip into separate reservoirs, each to supply the same color or different colors can be placed in them for coloring several strips at the same time, or when a wide paper has to be multi-colored it can be effected in one operation.

The features of this invention are disclosed in the following description with reference to the annexed drawings.

Figure 1 is an end view of the machine; Fig. 2, a part sectional front elevation; Fig. 3, a transverse section of the rolls and reservoir; Fig. 4, a plan of reservoir; Fig. 5, a section of multi-coloring roll.

A, A, are end frames tied by bars B. B.

C, is the driving shaft; D, gear wheel thereon for communicating motion by pinions E, E, to chased or striated rolls F, F, and also by pinions G, G, to the nip or pressure rolls H, H, carried by sockets I, I, in the slots of the end frames A, A. The sockets I, I, of the upper or pressure rolls H, H, have short links

J, J, connected, and these by the handle K and lever L can be lifted to admit of the material being passed between the rolls E, E, and rolls H, H, when first starting work.

M, M, are tension bars to prevent the paper or other material from sagging and to remove any creases that may be in the material as it comes from the reel P.

Q, is the steam or hot water pipe to supply the chased or striated rolls with warmth if required, the connection of the pipe with the trunk axle of the roll being packed to prevent leakage.

R, is the reservoir supplied from the removable container S by the tap T and U is the gate or rib which prevents too much color or other liquid coating agent being in the reservoir the overflow passing into the channel V and pipe V′ for flowing into the pail W for replacing into the container S.

X is a filtering screen to prevent air bubbles passing to the reservoir which may be caused by the liquid falling from the tap T.

Y is a wire mesh sheet with arms Z, Z, for operation by the cam *a* and rod *b*, the movement keeping the coloring agent of a uniform tint by slow agitation in the liquid.

The reservoir and the parts connected with it are supported on sliding bearers *c*, *c*, in guides *d*, *d*, and the bearers are capable of being raised and lowered on the screw rods *e*, *e*, when turned by the bevel pinions gear *f*, *f*, from the spindle *g* and outside handle *h* both ends of the reservoir being raised or lowered simultaneously to preserve the initial level of the liquid in it.

The machine can be driven by hand or by power from the fast and loose pulleys *i*, *j*, and the paper or other material when coated can be passed over above the pressure rolls H, H, to any convenient position to dry and if the chased or striated roll or rolls be in sections as at Fig. 5, four different colors could be put upon the paper, or four narrow strips could be passed through the machine at the same time or a single wide sheet could be passed through to receive the four colors or four strips of the same color could be imparted to a single width or any other variation can be made with the colors in the different reservoirs.

We claim—

1. In a machine for coating paper and similar material, the combination with the liquid conveying and applying rolls F, F, pressure rolls H, H, and tension guides M, of the adjustable liquid containing reservoir R, in which said conveying rolls work, a supply chamber S, for supplying liquid to the reservoir, a perforated screen X, placed in said reservoir and adapted to filter the material as it flows from chamber S to the reservoir, and means for agitating said material therein to insure a uniform color at all times, substantially as described.

2. In a machine for coating paper and similar material, the combination with the striated or channeled rolls F, F, adjustable pressure rolls H, H, and tension guides M, of the vertically adjustable liquid containing reservoir R, in which striated rolls F, F, work, a removable supply chamber S, and the gate or rib U, constructed in said reservoir and adapted to regulate the quantity of liquid contained therein, and the outlet pipe V′, substantially as described.

Dated the 17th day of March, 1893.

FRANK WALTER HAYWARD.
ALFRED STEPHEN KING.
ALFRED WOODBRIDGE LOVELAND.

Witnesses:

JAMES H. STUBINGS,
79 *Grove Rd., Norwich.*
F. HERBERT STEWARD,
65 *Heigham Rd., Norwich, Clerk to Messrs. Hansell & Hales, Solicitors, Norwich.*