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Patented Apr. 4, 1899.

J. H. SMITH.

APPARATUS FOR GRAINING METALLIC PLATES FOR SURFACE PRINTING.

(Application filed Dec. 7, 1898.)

(No Model.)

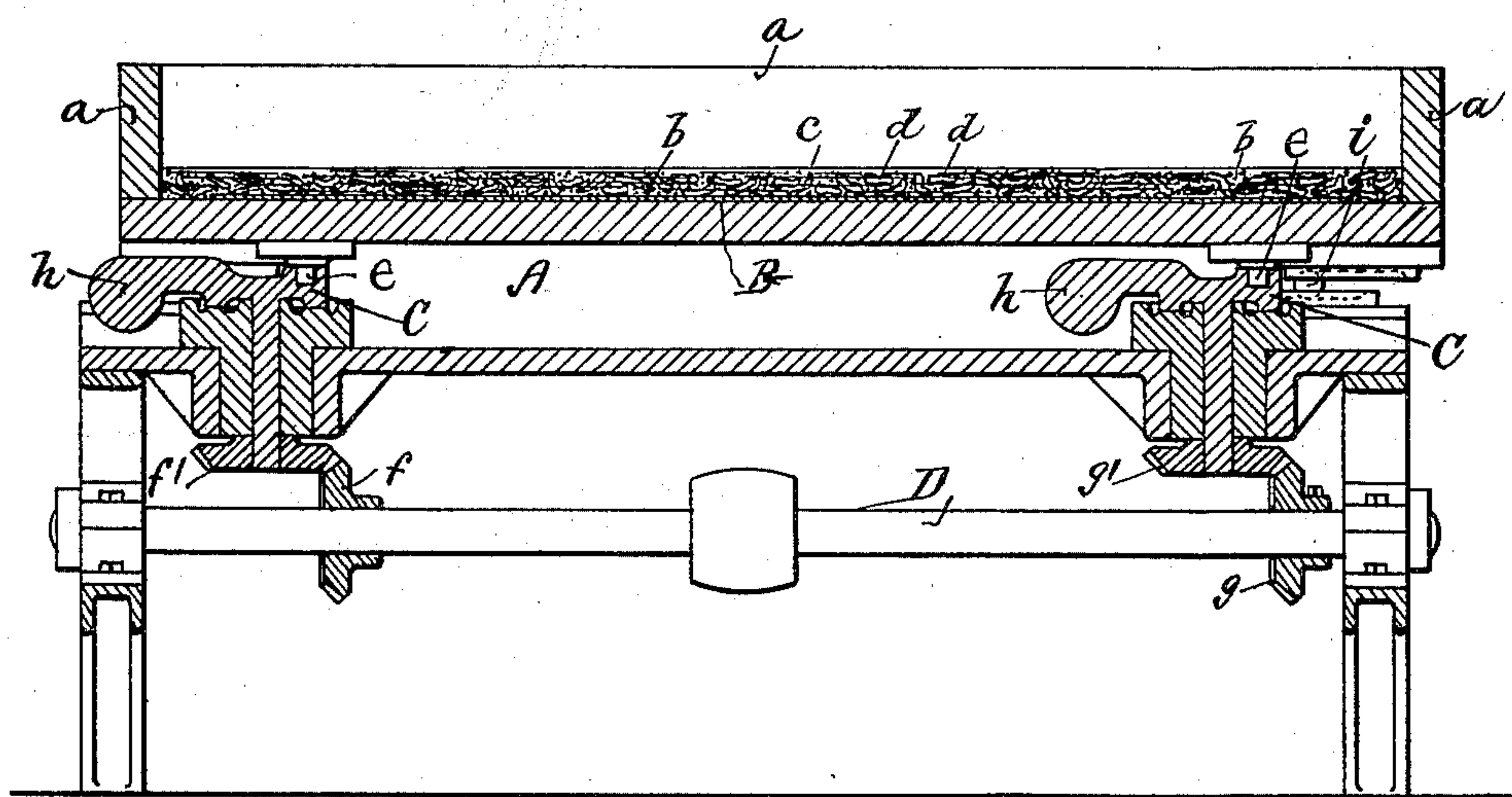
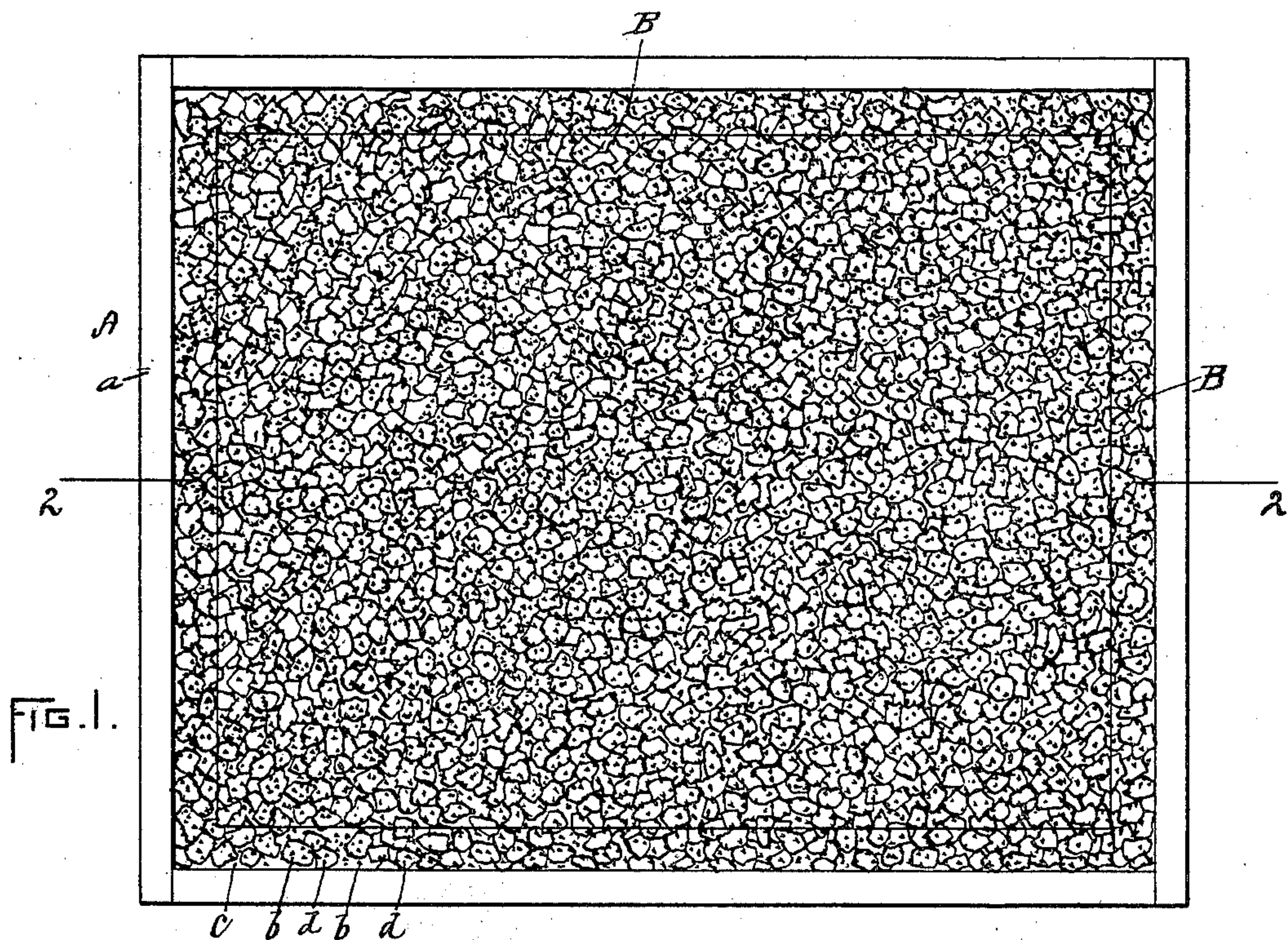


FIG. 2.

WITNESSES:

Saml. Gaveau
J. Drummond

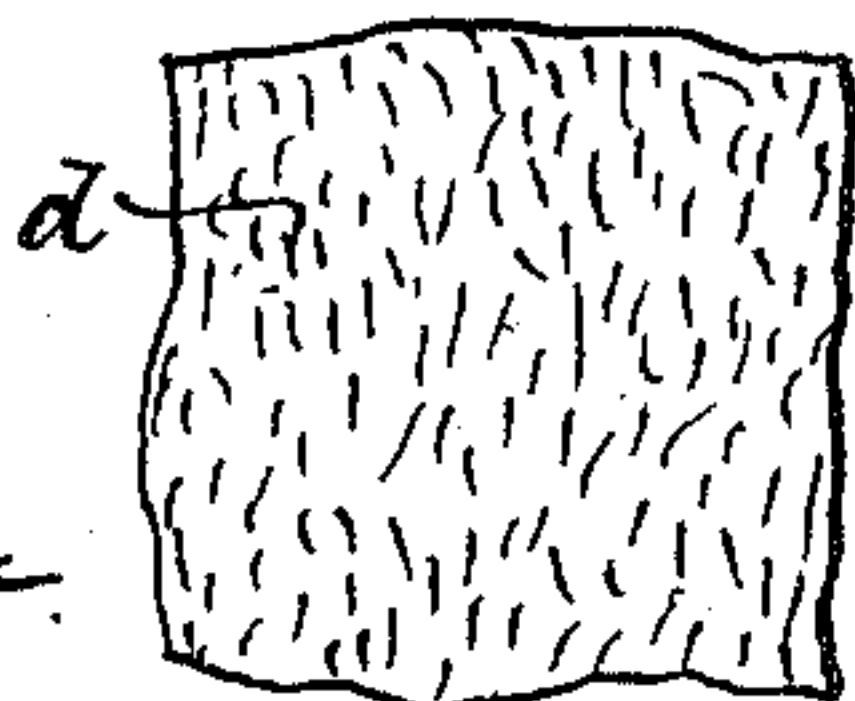


FIG. 3.



By

INVENTOR:

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UNITED STATES PATENT OFFICE.

JAMES H. SMITH, OF PROVIDENCE, RHODE ISLAND.

APPARATUS FOR GRAINING METALLIC PLATES FOR SURFACE PRINTING.

SPECIFICATION forming part of Letters Patent No. 622,554, dated April 4, 1899.

Application filed December 7, 1898. Serial No. 698,520. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. SMITH, of Providence, county of Providence, State of Rhode Island, have invented an Improvement in Apparatus for Graining Metallic Plates for Surface Printing, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In that class of printing which is known as "surface printing" mechanically-grained plates of zinc and aluminium are now extensively employed instead of lithographic stone; but heretofore it has not been possible by means of the apparatus employed for the purpose to produce as fine a grain upon the metallic plates as can be produced upon a fine lithographic stone. Hence the metallic plates have been employed only for the coarser grades of work.

It is the object of my present invention to provide means by which to produce upon metallic plates a grain which in its printing qualities is equal to that of the best lithographic stone.

In the accompanying drawings, taken in connection with the following description, I have disclosed my invention in the best form now known to me, although I desire it to be understood that I do not thereby restrict my invention to such particular form.

In the drawings, Figure 1 is a top or plan view of a machine containing my invention; Fig. 2, a vertical section taken in the line 2 2 of Fig. 1; and Fig. 3 represents in full size a side and edge view of one of the pieces of cloth or felt that are or may be employed as a graining device to produce, through a suitable graining agent, the required surface on the printing-plate.

Referring to the drawings, A represents one form of what I shall hereinafter designate as a "plate-support," upon or to which the plate B, of zinc, aluminium, or other suitable material to be grained, is secured in suitable manner, as by tacks. (Not shown.) This plate-support A may conveniently constitute, in whole or in part, the bottom of a suitable receptacle, the sides of which are indicated at *a a*.

The graining agent *b*, preferably a suitable grade of sand, is placed upon the surface of

the plate to be grained and within the receptacle, the walls of the latter permitting the introduction of sufficient liquid *c*, as water, to obtain the best results from the action of the graining agent. To distribute the sand and at the same time cause the same properly to act upon the surface to be grained, I provide one or more "graining devices" *d*, herein shown as of felt, which when the plate B is agitated is or are shaken about on the surface of the plate, causing the graining agent or sand to abrade or grain the said surface uniformly and smoothly throughout. This agitation of the plate and graining devices one with reference to the other may be obtained in various ways. In the present instance of my invention I obtain it by means of two cranks C C, the crank-pins *ee* of which are connected to the plate-support A, so that rotation of the crank imparts a rotary or gyrating movement to said plate-support and plate, causing the water, the graining agent, and the graining device or devices to be shifted about by inertia on the surface of the plate in various, also circular, directions, so as thoroughly and completely to grain every portion of the surface of the plate B. The cranks C C have their vertical shafts or journals fitted with bevel-gears *f' g'*, which are driven by corresponding gears *f g* on the driving-shaft D.

The plate-support or receptacle is shown as mounted at its four corners upon antifriction-balls *i*, thus providing for easy motion of the parts.

To balance the parts and enable the plate-support to be gyrated at a high rate of speed, I have counterbalanced the cranks C C with weights *h h*, so that no vibration whatever is felt of the floor upon which the machine is mounted.

Prior to my invention graining-machines have been provided wherein the graining devices have been spherical balls or marbles of stone, glass, or other hard refractory material, and while the coarser grades of graining have been successfully obtained by the use of such devices yet the action has been so harsh that it has been impossible to obtain a grained surface suitable for the first surface printing.

While it has heretofore been supposed that only hard and refractory materials could be

used to work the sand into and upon the surface of the metallic plate to be grained, I have, nevertheless, discovered, in accordance with my present invention, that graining devices
 5 of a light material having active surfaces that are yielding instead of rigid and hard produce a much finer grain than has heretofore been deemed possible.

The yielding surface of my new graining
 10 device produces a less harsh action of the graining agent upon the surface of the metallic plate than the hard graining device heretofore employed, and at the same time by reason of its yielding nature my novel grain-
 15 ing device acts between or around the finer particles of the graining agent or otherwise to reduce the harshness of the graining action and leave the grained surface finer than would otherwise be possible. I have found
 20 felt, such as shown in Fig. 3, to be excellently adapted for this purpose because of its soft yielding surface, which produces a mild grain- ing action coupled with an apparent wiping, which still further reduces the tendency to
 25 coarseness of the grain. By absorbing the water and holding to a greater or less extent the particles of the graining agent it furnishes the required weight and surface, which in practice produce the best results yet known
 30 to me.

In place of the felt I may employ any other material that furnishes a more or less yield- ing active surface—such as cloth, wood, saw- dust, excelsior, rubber, leather, cork, pulp,
 35 &c.—and the graining devices themselves may be of desired size and shape.

I find the best results to be obtained from a large number of relatively small pieces or de- vices massed upon the surface to be grained;
 40 but the number may be varied. In fact, excellent results may be obtained by means of a single layer, sheet, or device presenting the required surface of the plate.

In the present instance of my invention the
 45 relative movement between the graining de- vices and the metallic plate is obtained by agitation of the plate, causing the graining devices and the graining agent or agents by their inertia to be shifted about and upon the
 50 surface of the metal; but my invention com- prehends any suitable shape or construction of receptacle, if a receptacle be employed, and any desired means for causing the shifting of the graining device or devices about and upon
 55 the metallic surface to be grained.

In the machine herein shown and described the agitation or movement imparted to the plate-support A is in an endless path, shown
 60 as circular, so that the movement or move- ments of the graining device or devices de- posited on the plate is or are likewise endless, and the endless or circular paths of movement of the graining device or devices on the plate will interlace one with another so closely as
 65 to produce an absolutely uniform graining ac-

tion upon the plate, free from pronounced streaks in one direction as compared with an- other, as would result if there was a pro- nounced movement of the support or the graining device or devices in any one direc- tion as compared with others—for example, as when the support is reciprocated forward and back in a straight line, in which case the graining action is not as uniform as when the movement is such as to be substantially uni-
 7 form in all directions without prominence in any one.

The machine shown illustrates the simplest means for producing such a uniform graining action, although it is not necessarily the only
 8 means, nor is my invention limited specifically to this means.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a graining-machine, the combination with a support for a plate to be grained, of a graining agent, and one or more graining de- vices loosely arranged with reference to said plate-support and the plate thereon, each of
 9 said graining devices having a yielding sur- face, means to impart to said graining devices and to said plate-support and plate a relative body movement adapted in the presence of the graining agent to produce the required
 10 grained surface upon the plate, and means surrounding said plate to retain the graining devices and graining agent thereupon.

2. In a graining-machine, the combination with a support for a plate, of a graining agent and one or more felt graining devices loosely arranged with reference to said plate-support and plate, and having each a yieldingsurface, and means to impart thereto and to said plate- support and plate a relative body motion
 11 adapted in the presence of a graining agent to produce the required surface, and means surrounding said plate to retain the graining devices and graining agent thereupon.

3. In a graining-machine, a support for the plate to be grained, a graining agent, one or more graining devices adapted to be arranged loosely upon the said plate, means to impart to said graining device or devices and to said plate-support, at all points thereof, a uniform
 12 relative motion in an endless path to cause said graining device or devices to grain the plate-surface uniformly and without pro- nounced streaks in any one direction as com- pared with another and means surrounding
 13 said plate to retain the said graining devices and graining agent thereupon.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES H. SMITH.

Witnesses:

MARCUS M. BURDICK,
 IDA F. DROWN.