

April 29, 1941.

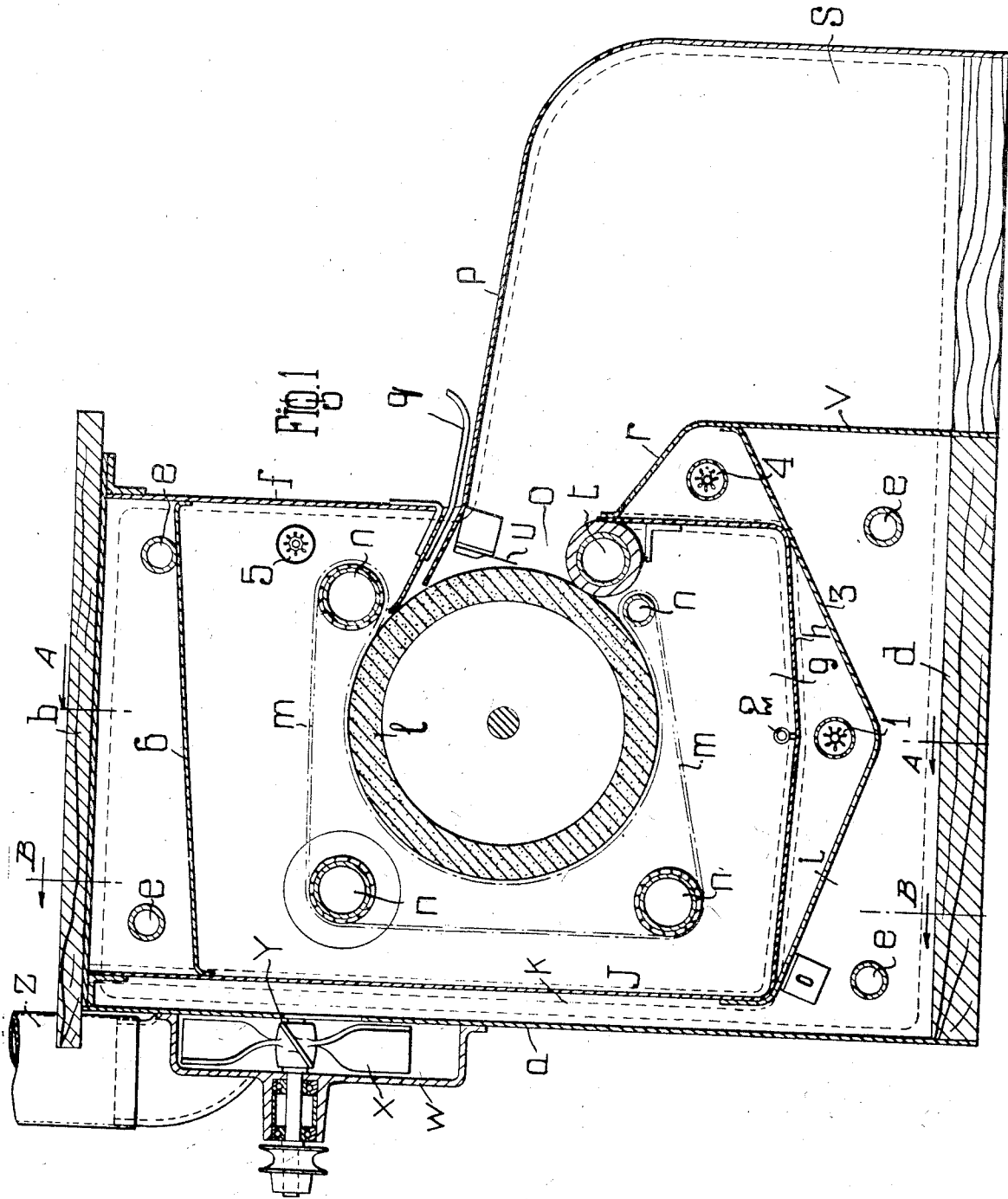
S. H. MORSE

2,240,409

APPARATUS FOR DEVELOPING SENSITIZED LAYERS

Filed April 20, 1933

2 Sheets-Sheet 1



Inventor:
Sydney H. Morse
By: Mason & Porter
Attorneys

April 29, 1941.

S. H. MORSE

2,240,409

APPARATUS FOR DEVELOPING SENSITIZED LAYERS

Filed April 20, 1939

2 Sheets-Sheet 2

Fig. 2.

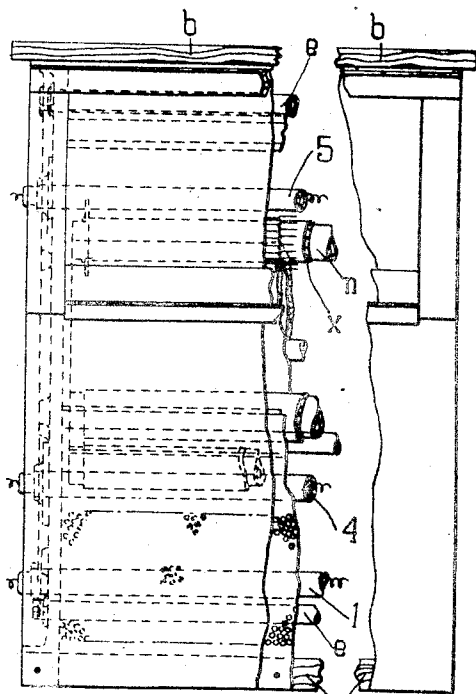


Fig. 4.

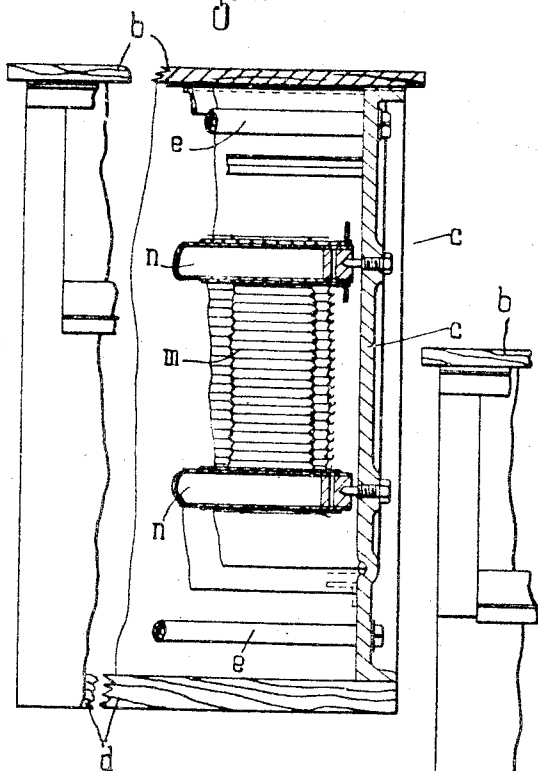
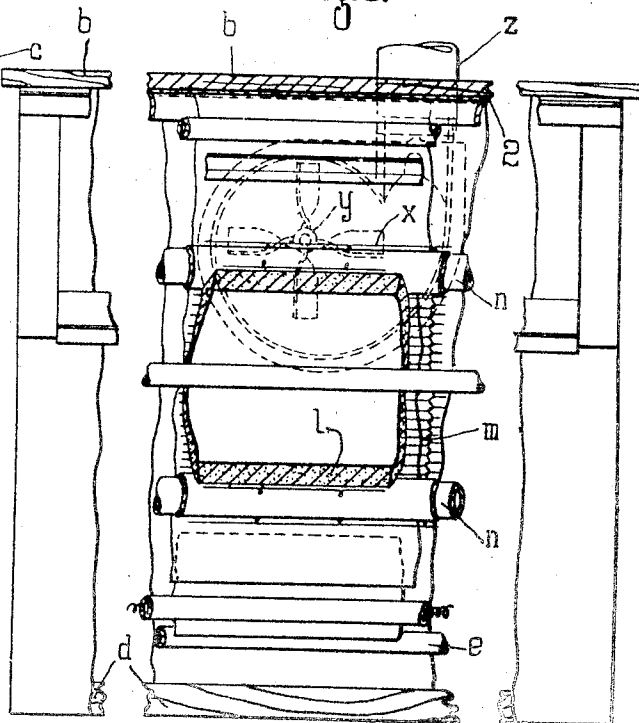


Fig. 3.



Inventor.

Sydney H. Morse

by

Mason & Porter
Attorneys

UNITED STATES PATENT OFFICE

2,240,409

APPARATUS FOR DEVELOPING SENSITIZED LAYERS

Sydney Harold Morse, London Wall, London, England, assignor to Wood, Mallabar and Company Limited, London, England, a corporation of Great Britain

Application April 20, 1938, Serial No. 203,206
In Great Britain April 26, 1937

6 Claims. (Cl. 95—94)

The invention relates to apparatus for developing sensitized layers, in which the said layers are subjected to the action of ammonia or other developing gas.

In apparatus of this kind it is essential that whilst the developing medium must be maintained at the right degree of humidity in order to obtain perfect development, at the same time moisture must not be allowed to condense upon the surface of the sensitized layer as this results in imperfect development.

The object of the invention is to provide a simple and compact apparatus for developing sensitized layers by the action of ammonia or other gas which is in a continuous humid state in which the moisture content of the developing gas is prevented from condensing upon or in the immediate vicinity of the layers whilst they are passing through the developing tank.

The invention consists in apparatus for developing sensitized layers by ammonia gas or other vapour produced by evaporating a liquid, in which a flow of cold air is caused to pass over at least one of the longitudinal walls of the developing tank thereby to reduce the temperature of said wall relatively to that of the remainder of the tank and cause any condensation which may take place inside the tank to be concentrated on said wall away from the said layers.

The invention also consists in the further features hereinafter described and claimed.

The invention will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a cross section through the apparatus.

Fig. 2 is a fragmentary front elevation.

Fig. 3 is a fragmentary elevation partly in section on the line A—A of Fig. 1.

Fig. 4 is a fragmentary elevation partly in section on the line B—B of Fig. 1.

In carrying the invention into effect, there is provided a rectangular or box-shaped housing of sheet metal comprising a back cover plate *a* and top cover plate *b* extending between a pair of end plates *c* secured to a base *d* and held together by any convenient means such as stretcher bars *e*. The said housing is provided with a front cover plate *f* which also constitutes the front wall of a developing tank *g* of oblong form extending from end to end of the apparatus and closed at its ends and on top, by the end plates *c* and top cover plate *b* respectively of the housing proper. At its lower end said tank is closed by a bottom plate *h* arranged some distance above the main base plate *d* so as to leave a horizontal space *i* extending the whole width of the housing

and from end to end thereof. The tank *g* is completed by the rear plate *j* which extends from one end plate *c* to the other parallel to the outer rear cover plate *a* on the inside thereof and at a distance therefrom so as to leave a vertical space *k* extending from top to bottom of the housing and also from end to end thereof, the vertical space *k* at its lower end communicating along the whole of its length with the longitudinal space *i*.

Mounted within the tank *g* and extending substantially the whole length thereof, is a revolving cylinder *l* preferably of porous material such as fibrous cement and onto which the sensitized layers are adapted to be fed, the said layers being retained upon said cylinder by means of an endless open mesh wire belt *m* supported upon rollers *n* rotatably mounted at their ends in the end plates *c*.

A longitudinal gap *o* is provided in the front plate *f* opposite the cylinder *l*, for the purpose of permitting the sensitized layers to enter and leave the tank. Connected at its inner end to the upper edge of the gap *o* is a plate *p*, which after sloping slightly downwards away from the front plate *f* for some distance is then bent vertically downwards to join the base plate *d*. The plate *p*, which at its inner end penetrates within the tank *g* as far as the surface of the cylinder *l*, serves as a table for feeding the layers into the tank and onto the cylinder, and at the same time prevents the escape of the developing gas from the upper part of the tank.

An additional guide member *q* may be provided immediately above the feed table *p* where it enters the tank, which guide member also extends within the tank as far as the cylinder and ensures the layers being guided between the cylinder and the wire mesh belt.

A second plate *r* is connected at its inner end to the lower edge of the longitudinal gap *o*, which plate also slopes away from the front plate *f* but only for a relatively short distance, after which it is bent vertically downwards parallel to the outer plate *p*, the two plates *p* and *r* constituting between them a delivery chute *s* which is open at its lower end and through which the layers are discharged after passing through the tank. In order to guide the developed layers into the delivery chute *s*, a roller *t*, preferably of resilient material such as rubber, is rotatably mounted inside the tank adjacent the lower edge of the gap *o* which roller also serves as a seal to prevent the escape of gas from the lower part of the tank *g*. To assist further, the removal of the devel-

oped layer from the cylinder *l*, a "pick-off" scrap-
er *u* may be arranged within the gap *o* in the
most suitable position.

A series of communicating vents or openings *v*
are provided in the inner plate *r* of the delivery
chute *s*, whilst at its upper end, the rear plate *a*
of the housing has secured thereto a casing *w*
within which is mounted an exhaust fan *x*. The
casing *w* communicates on the one hand, through
an opening *y* in the rear plate *a*, with the vertical
space *k*, and on the other, with an outflow venti-
lating pipe *z*.

The tank *g* is maintained at the required tem-
perature by means of a heating element *l* posi-
tioned underneath the bottom plate *h* of the
tank, the developing gas being generated by al-
lowing developing liquid such as liquid ammonia
to drip on to the hot plate *h* from a feed pipe *2*
which is connected at its outer end to a filler
or charger (not shown) arranged on the outside
of the apparatus.

When the exhaust fan *x* is rotated a contin-
uous flow of cold air is drawn in through the
open lower end of the chute *s* and passes by way
of the vents *v* into the horizontal space *i* beneath
the tank and up through the vertical space *k*
from whence it passes by way of the opening *y*
into the outlet flow pipe *z*. In this way cold
air is constantly passing over the rear wall *f* of
the developing tank thereby maintaining said
wall at a lower temperature than that of the
rest of the tank so that any condensation must
take place on this wall which is the coolest part
of the tank. By concentrating any condensation
which may take place, upon a particular part of
the tank the cylinder *l* and its associated wire
belt *m* as well as the sensitized layers are main-
tained free from such condensation. Further,
any developing media which has condensed on
the rear wall *f* of the tank will drain down into
the bottom of the tank where it will again be-
come vaporised.

In order to shield the heating element *l* from
the air draught flowing through the space *i* un-
derneath the tank and to ensure the bottom plate
h of the tank being maintained sufficiently hot,
a plate *3* preferably of V-shaped cross section is
provided below the tank. This plate which slopes
downwardly from the front and back of the tank
towards the centre so as to enclose the bottom
of the tank and the heater *l*, extends along
the whole length of the tank.

Additional heating elements *4* and *5* may be
provided outside the lower portion and inside
the upper portion respectively of the front plate
f of the developing tank which elements are
mainly intended for preliminary warming up of
the tank when starting from cold. When the de-
sired temperature is reached and the apparatus
ready to receive the layers it will generally be
found that these additional heating elements may
be switched off and only the main heating ele-
ment *l* retained in use. If desired the elements
may be thermostatically controlled in any known
manner so as to be automatically switched off
when the desired temperature is reached in the
developing tank.

A cover plate *5* is preferably provided at the
top of the heating tank *g* which plate is given a
gentle slope downwards towards the rear wall *f*
of the tank so that any slight condensation which
may take place at the top of the tank will be
caused to run back on to the rear plate *f* and be
prevented from falling upon the cylinder *l*, wire
belt *m* and the sensitized layers.

The layers are fed into the tank over the feed
table *p* where they are gripped between the cyl-
inder *l* and wire belt *m* and after being taken
round with said cylinder are ejected through the
gap *o* into the delivery chute *s*. The wire mesh
belt makes a positive grip upon the cylinder *l*
so that there is no slip between the two during
rotation of the cylinder and whilst the sensi-
tized layer held therebetween is passing through
the tank. Further, the open mesh of the wire
belt ensures that the whole of the surface of the
sensitized layer is accessible to the developing
gas.

Finally, any ammonia fumes which may escape
from the developing tank will be drawn by the
draught of cold air underneath the tank from
the delivery chute *s* and up through the space
k to the outflow pipe *z*.

I claim:

1. An apparatus for developing sensitized lay-
ers by ammonia or other vapor, comprising a de-
veloping tank having longitudinal walls, means
for heating said tank to generate the vapor,
means for feeding the sensitized layers through
the apparatus, and means for causing the pas-
sage over at least one of said longitudinal walls
of a flow of cold air sufficient to cause any con-
densation of vapor to take place upon said wall
and not on the sensitized layers.

2. Apparatus for developing sensitized layers
by ammonia or other vapor, comprising an ex-
ternal housing having a rear wall, a developing
tank having a rear wall spaced from the rear
wall of said housing to form a space extending
from the top to the bottom of and along the whole
length of said developing tank, means for heat-
ing said tank, means for feeding sensitized lay-
ers through the apparatus, and means for caus-
ing the passage through said space of a flow of
cold air sufficient to cause any condensation of
the vapor to take place on the rear wall of said
tank and not on the sensitized layers.

3. An apparatus for developing sensitized lay-
ers comprising a developing tank, means for
feeding sensitized layers through the apparatus,
means for causing the passage of a flow of cold
air over a part of the surface of said tank suf-
ficient to cause any condensation of the vapor
to take place on this part of the tank and not
on the sensitized layers, means for heating said
tank, and shield for shielding said heating means
from the flow of cold air.

4. An apparatus for developing sensitized lay-
ers by ammonia or other vapor, comprising a
developing tank, means including a porous cylin-
der and an open mesh endless wire belt for feed-
ing the sensitized layers through the apparatus,
means for heating said tank, and means for caus-
ing the passage of a flow of cold air over a part
of the surface of said tank sufficient to cause any
condensation of the vapor to take place on this
part of the tank and not on the sensitized layers.

5. An apparatus for developing sensitized lay-
ers by means of ammonia or other vapor, com-
prising a developing tank, means for heating said
tank to generate the vapor, additional heating
elements in the upper and lower parts of said
tank and disposed inside and outside thereof, said
additional heating elements adapted to be cut
out when a desired temperature is attained in-
side the tank, means for feeding sensitized lay-
ers through the apparatus, and means for caus-
ing the passage of a flow of cold air over a part
of the surface of said tank sufficient to cause any
condensation of the vapor to take place on this

part of the tank and not on the sensitized layers.

6. An apparatus for developing sensitized layers by means of ammonia or other vapor, comprising an external housing having a rear wall, a substantially gas-tight developing tank having a rear wall spaced from the rear wall of said housing to form a space extending from top to bottom of and along the whole length of said tank, an opening in the front wall of said housing, means for heating said tank to generate 10

vapor therein, means including a roller disposed within said tank and having its longitudinal axis parallel to the rear wall of said tank for sealing said opening and for feeding the sensitized 5 layers through the tank, and means for causing the passage through the space between said rear walls of a flow of cold air sufficient to cause any condensation of vapor to take place on the rear wall of said tank and not on the sensitized layers.

SYDNEY HAROLD MORSE.