

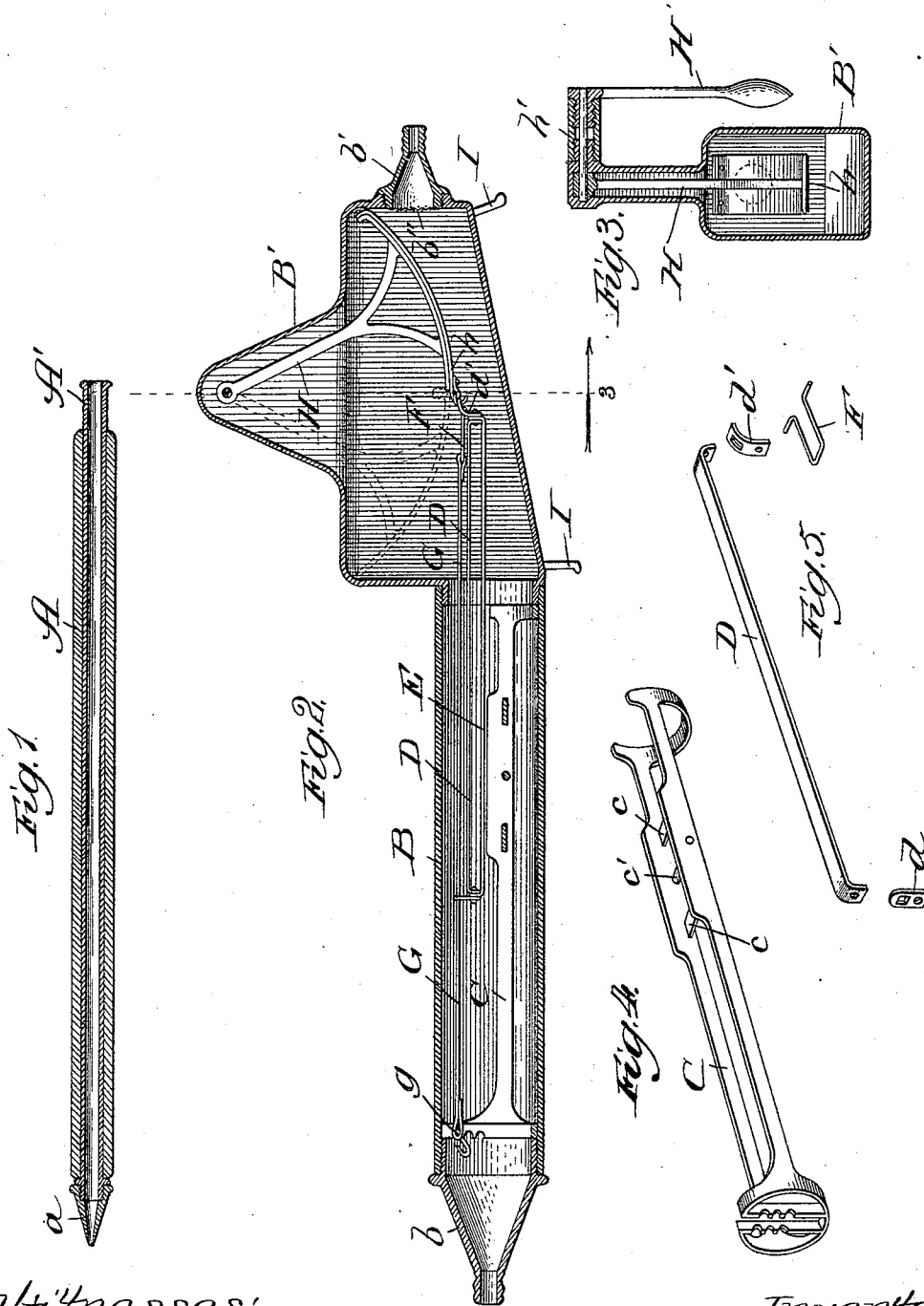
(No Model.)

N. A. CHATFIELD.

PROCESS OF AND APPARATUS FOR PNEUMATIC DRAWING.

No. 461,667.

Patented Oct. 20, 1891.



Witnesses:
Ed. Gaylord,
Clifford H. White.

Inventor,
Norman A. Chatfield,
By Danning & Danning & Ryson,
Attorneys.

UNITED STATES PATENT OFFICE.

NORMAN A. CHATFIELD, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, OF ONE-HALF TO ABSALOM E. HOOVER, OF SAME PLACE.

PROCESS OF AND APPARATUS FOR PNEUMATIC DRAWING.

SPECIFICATION forming part of Letters Patent No. 461,667, dated October 20, 1891.

Application filed November 29, 1890. Serial No. 373,095. (No model.)

To all whom it may concern:

Be it known that I, NORMAN A. CHATFIELD, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented a new and useful Process of Pneumatic Drawing and Apparatus for Carrying out Such Process, of which the following is a specification.

I have discovered by continued experiment that if crayon, dry paint, black-lead, or other coloring-matter or similar substance be pneumatically forced while in a powdered or finely-divided state against the surface of the paper or other material used in drawing the particles of the substance will become attached thereto or be forced under or between the fibers of the paper, or, in other words, become partially incorporated therewith, producing a mark of greater or less size according to the size of the current of compressed air, or according as the apparatus is moved toward or from the paper. By moving the apparatus through which the current passes in one direction or another, lines of any form or dimensions may be formed.

This process may be employed in drawing and finishing portraits, landscapes, designs, &c., and to carry out such process I have devised a machine whereby the current of compressed air may be directed as desired, and whereby the crayon or other substance used may be powdered or ground and introduced into the current of air; and my invention consists in the process and apparatus for carrying out the same, as hereinafter described.

In the drawings, Figure 1 is a central vertical longitudinal section of the pneumatic pencil used in carrying out the process; Fig. 2, a similar section of the grinding-machine; Fig. 3, a section on line 3 3 of Fig. 2, looking in the direction of the arrow; Fig. 4, a perspective view of a cradle or frame used to support the substance being ground, and Fig. 5 similar views of parts of the apparatus.

The pencil A is made of any suitable dimensions, and, as shown, is hollow throughout its length and provided with a tip *a*, adjustably connected to the body of the pencil by screw-threads or in any other suitable manner. The size of the opening in this tip de-

termines the size of the blast, and when it is desired to increase or diminish the size thereof the tip may be taken off and replaced by a larger or smaller one. The tube A', which forms the inner lining of this pencil, extends, as shown, out of the rear end thereof, and is adapted to be inserted into the end of a flexible tube, which is connected, as hereinafter described, with the grinding-machine. This grinding-machine consists of a case or sheath made in two parts B B', the part B' consisting of a case or sheath of suitable dimensions to receive the parts hereinafter to be described, and made of any suitable material and preferably in the form shown in Figs. 2 and 3 of the drawings, and provided with clamps I, whereby it is attached to the ordinary maul-stick. The part B consists of a tube attached by means of screw-threads or in any other suitable manner to the case B', as shown. To the left-hand end of this tube B is attached a taper thimble *b*, adapted to be connected with any suitable source of compressed air and supply—as, for instance, an air pump or reservoir. A similar thimble *b'* is attached to the right-hand end of the sheath B' and is connected, preferably by means of a flexible tube, (not shown,) with the rear end of the tube A'. To prevent clogging of the tube, I prefer to place over the inner end of the thimble *b'* a piece of wire-gauze *b''*.

In the tube B is secured a frame or cradle C, preferably made in the form shown in Fig. 4, wherein it is circular at one end and semicircular at the other, of a proper size to fit the interior of the tube, the two end pieces being connected by side bars or rods. The circular end is open, as shown, to afford a free passage for the air. This cradle is provided with cross-bars *c*, on which is placed the material to be ground, and a set-screw *c'*, whereby the sides of the cradle are adjusted to bind against such material and hold it in place. The cradle when inserted into the tube B may be held in place by means of the end of the sheath B' and the taper thimble *b*, though any other means may be used, as desired. Immediately above the cradle is placed a bow D, preferably of the form shown more particularly in Fig. 5, and a piece of emery-cloth or similar

substance E is attached to the downwardly-projecting ends of the bow D by means of clamp-plates d d' , which are screwed to the end of the bow. A loop F is attached to the forward end of the bow, and to this is fastened one end of an elastic band G, the other end of which is attached to a cross-rod g , engaging with notches in the rearward side of the circular end of the cradle C, by means whereof the elastic band and bow may be adjusted at different distances from the cradle C. The clamp-plate d is provided with a loop, as shown, through which the elastic band passes, and which serves as a guide for such band and support for the bow. I next construct a segmental lever H, which is pivoted in the sheath B. To one end of this lever is attached a strap h , the other end of which is attached to a loop in the clamp-plate d' . The shaft or spindle of the lever H passes, as shown in Fig. 3, out through the case, and a lever H' is secured thereto, the opening where the shaft passes through the case being covered by an elastic tube h' to prevent the escape of air. From this construction it will be seen that as the lever H' is pressed toward the right, Fig. 2, the lever H will be moved in the same direction, carrying along with it the bow and the emery-cloth attached thereto, drawing such cloth across the surface of the material to be ground and grinding a portion thereof, and that as the pressure on the lever H' is released the elastic band G will draw the bow and paper toward the left, Fig. 2, bringing the lever H into the position shown in the dotted lines and again drawing the emery-cloth across the surface of the material to be ground. In this way by alternately pressing the lever H' and releasing such pressure a reciprocating motion is imparted to the bow and cloth, which pass back and forth upon the surface of the material, grinding off particles from the same.

The parts being constructed and put together as shown, the thimble b being connected with a suitable source of compressed air, and the thimble b' with the pneumatic pencil, the device is operated as follows: The case inclosing the grinding mechanism is preferably held in the left hand and the pneumatic pencil in the right. The air is admitted under pressure to the case BB', and a reciprocating motion being imparted to the bow and emery-cloth, as hereinbefore described, the material supported in the cradle is ground with greater or less rapidity, as desired. As the particles are ground off they immediately enter the blast, which becomes charged therewith and by which they are carried through the pencil and forced against the paper to which they attach themselves or with which they become partially incorporated. By moving the pencil as necessary any portrait, landscape, design, &c., may be drawn upon the paper or other material used. By varying the intensity of the blast the size of the nozzle a and the rapidity of the grind-

ing the intensity and size of the line drawn may be varied easily, as occasion may demand.

In using this apparatus lines of the utmost fineness and delicacy may be drawn, and drawings of any sort and in any color can be executed with great rapidity and precision. As great force is exerted by the blast, the finely-divided particles are not only deposited upon the surface of the material used, but, as shown by a microscopical examination, they are forced between or partially under the fibers thereof, becoming to a greater or less extent incorporated with a part of the material itself. This adds greatly to the durability of the drawings, the lines, if made by a current or stream of air under pressure, being almost indelible.

As will be evident, the apparatus is exceedingly simple, consisting, as it does, of but few parts, which are easily adjusted or replaced. It should be understood that I do not intend to limit myself to the exact forms herein given to the several parts, since form not being essential to the successful operation of the device the parts may be varied in many ways, as desired—as, for example, a coiled spring may be used in place of the elastic band G, or the tube may be attached to the pencil in other ways than that herein shown, and any such changes I regard as coming within the spirit and gist of my invention, which consists, as regards the process in drawing pictures, &c., by pneumatically forcing powdered or finely-divided material against the surface upon which the picture is to be drawn and as regards the apparatus in providing a suitable device for carrying out the process.

In order to carry out the process, it is not necessary to use the exact form of mechanism herein shown, since the material may be governed in any other way desired and then forced against the surface on which the drawing is to be made by the air-pressure. The machine herein shown is therefore intended but as an illustration of one form of apparatus by means whereof the process may be carried out, and as a limitation to that form alone.

I claim—

1. The process of drawing, which consists in pneumatically forcing finely-divided crayon, dry paint, or similar material against a dry surface upon which the drawing is to be made, whereby the particles of such material become attached to such surface, substantially as described.

2. The process of drawing, which consists in reducing crayon, dry paint, or similar material to a finely-divided state while exposed to an air-blast, whereby as the particles of such material are ground off they are carried along by the blast and forced against the surface upon which the drawing is to be made, becoming thereby incorporated with such surface, substantially as described.

3. The combination of a hollow pencil, a

grinding mechanism connected therewith, and means for forcing air through the pencil and grinding mechanism, whereby the substance ground is blown out through the pencil, substantially as described.

5 4. The combination of a case B B', a cradle C, a bow D, grinding material secured by means of suitable clamps, and means for imparting a reciprocating motion to such bow, 10 substantially as described.

5 5. The combination of a case B B', a cradle C, a grinding-bow D, an elastic band G, attached to the bow and cradle, a lever H, connected to the bow, a lever H', rigidly attached 15 to the lever H, whereby the bow is moved in one direction by the lever H' and in the other by means of the band G when the lever is released, substantially as described.

20 6. A cradle C, provided with cross-bars c to support the material to be ground, and a set-screw c', substantially as described.

7. The combination of a case B B', a cradle C, a bow D, grinding material secured thereto, a lever H and band G, attached to the bow, a lever H', rigidly connected to the lever H, 25 a pencil A, connected to the case B B', and means for forcing air through the case and pencil, whereby as the material upon the cradle is ground by means of the bow it is blown by the air through the pencil, substantially 30 as described.

8. The combination of a cradle, a grinding-bow, and an elastic band attached to the bow and adjustably connected with the cradle, whereby the bow is adjusted at different distances from the cradle, substantially as described.. 35

NORMAN A. CHATFIELD.

Witnesses:

THOMAS A. BANNING,
SAMUEL E. HIBBEN.