No. 858,383. PATENTED JULY 2, 1907.

E. HAEFELY.

MACHINE FOR MANUFACTURING INSULATING TUBES.

APPLICATION FILED SEPT. 6, 1904.

Fig. 1

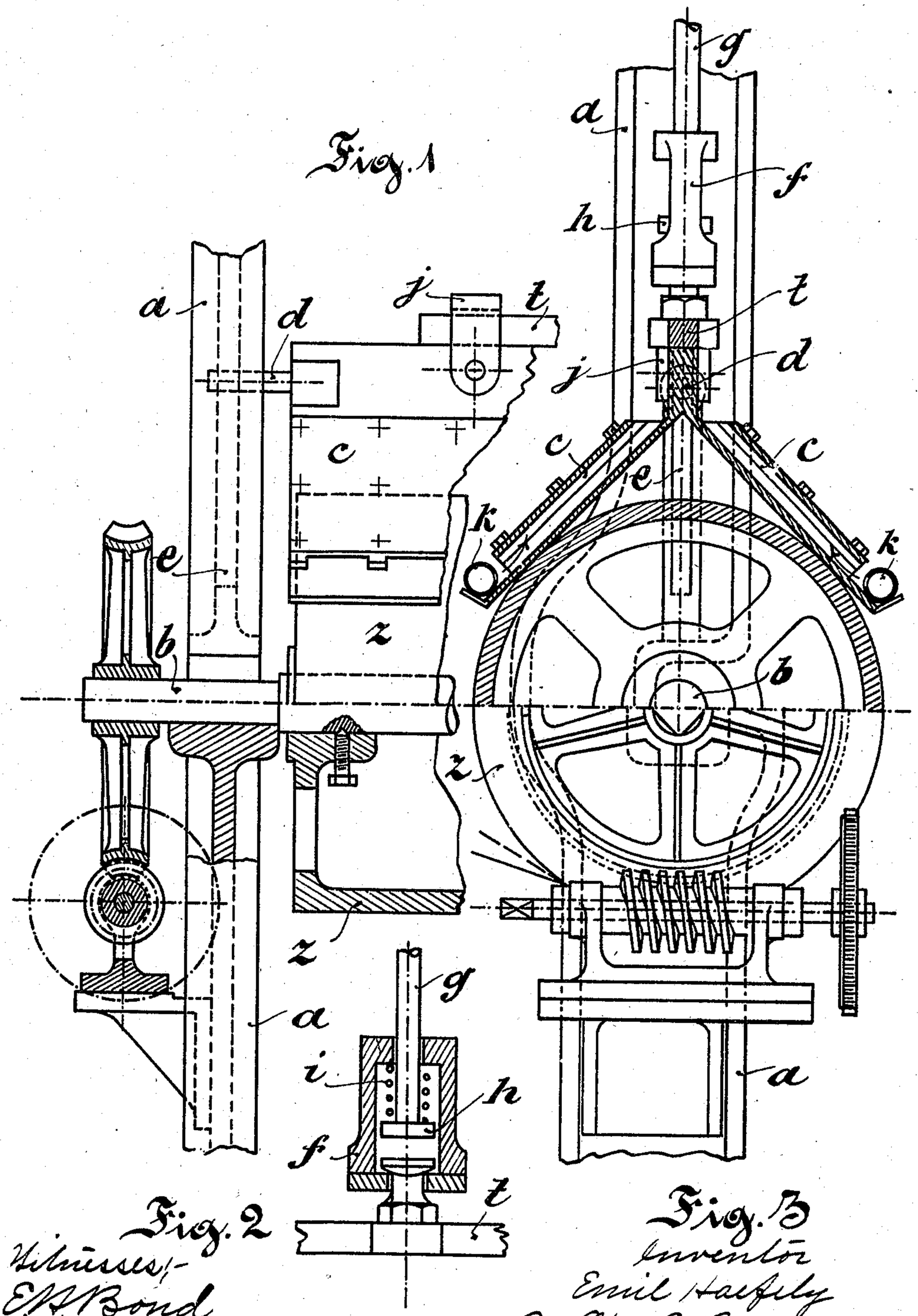

Fig. 2

Witnesses:-
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Fig. 3

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MACHINE FOR MANUFACTURING INSULATING-TUBES.

No. 858,383. Specification of Letters Patent. Patented July 2, 1907.

Application filed September 6, 1904. Serial No. 223,441.

To all whom it may concern:

Be it known that I, EMIL HAEFELY, a citizen of the Republic of Switzerland, residing at Basel, in Switzerland, have invented certain new and useful Improvements in Machines for Manufacturing Insulating-Tubes, of which the following is a specification.

My invention relates to the manufacture of insulating tubes and more particularly to machines for manufacturing tubes of comparatively large diameters.

The object of my invention is to provide a machine which shall be simple and compact in construction and which shall operate effectively to produce insulating tubes of superior quality and of uniform density and dimensions.

With these ends in view, my invention comprises as essential elements a rotatable drum, a pressure device having a pressure surface of angular or V-shape in cross section and means for applying heat to the material as it is formed into tubes.

In the accompanying drawing, Figure 1 is a view partially in rear elevation and partially in section of a portion of a machine constructed in accordance with my invention. Fig. 2 is a detail, sectional view of a portion of the mechanism for raising and lowering the pressure device and Fig. 3 is a view, partially in end elevation and partially in section, of the machine; a portion of which is shown in Fig. 1.

The machine frame is here represented by one of its standards *a* and suitably journaled in the standards is a shaft *b* one end of which is provided with a worm wheel B. The wheel B is engaged by a worm C, the shaft D of which is driven from any suitable source of power by means of gearing represented at E.

Mounted upon the shaft *b* is a drum *z*, the drum being detachably fastened to the shaft by suitable means, such as set screws, one of which is shown at *b'*. It will be understood that the drum is detachably mounted upon its shaft in order that it may be replaced by a drum of either larger or smaller diameter when it is desired to manufacture insulating tubes of different dimensions from those which may be manufactured by the use of the drum here shown.

The pressure device C which is utilized in connection with the drum *z* comprises two hollow plates *c'* which project downwardly and outwardly from each other at a suitable angle, here shown as substantially a right angle, to form a trough shaped structure and is loosely suspended from a cross bar *t* by means of clips or hangers *j*. The cross bar *t* is provided with a hanger stud *t'* the head of which is engaged by the lower end of a connector *f* into which projects the lower end of a rod *g*, which may be actuated by suitable mechanism for raising and lowering the cross bar and with it the pressure device *c*. The lower end of the rod *g* is provided with a head *h* between which and the upper end of the device *f* is interposed a helical spring *i*. This structure is provided in order that the combined weight of the pressure plates and the cross bar *t* may exert the desired constant pressure upon the material as it is applied to the drum *z*. The interposition of the spring *i* also insures a gradual application of pressure to the drum as the pressure device is lowered into operative position and also a gradual removal of the weight of the pressure device when it is raised from the drum, thus avoiding any possible injury to the surface of the tube, either during formation or after completion.

The ends of the pressure device *c*, at or just above the angle at which the plates *c'* meet, are provided with pins *d* which project into slots or grooves *e* in the standards *a* whereby such freedom of movement is permitted as will allow automatic adjustment of the pressure plates to insure uniformity of pressure upon the drum. The pins *d* and slots or grooves *e* also serve to guide the pressure device so that the apex of the angle between the plates shall be maintained parallel to the axis of the drum and vertically above the same.

In order to apply such heat to the material as is necessary to insure the formation of a tube of the desired characteristics and superior quality, I locate gas pipes *k* adjacent to the open lower ends of the pressure plates *c'*, the said pipes being provided with small apertures adjacent to said open ends so that the gas will escape in small jets which, when lighted, will serve to heat the plates to the desired temperature, the products of combustion passing through the plates and escaping at the top thereof. Other means such as steam or electricity may, of course, be employed for heating the pressure plates, if desired.

In the use of the machine above described the pressure plates are first heated by means of the gas issuing from the pipes *k* and, when the desired temperature has been obtained, paper or other suitable fibrous material is fed to the drum *z* from a suitable source and is wound once around the drum. The surface of the paper or other fabric is then coated with a layer of suitable varnish or other similar binding material, and the drum is rotated at a suitable speed to secure the formation of a tube of the character desired. In case a tube composed of paper, mica and varnish is desired, the mica is placed upon the coating of varnish as the paper passes to the drum and thus constitutes an intermediate layer between the varnish and the preceding outside layer of paper. As shown in Fig. 3, the paper is indicated at *p* and the mica at *m*.

The simultaneous application of heat and pressure by means of the pressure device *c* serves to melt the varnish and compress the layers of paper and varnish or the layers of paper mica and varnish into such intimate

contact as to produce a tube of great compactness and density as well as of uniform dimensions. The length of the tube formed may be substantially equal to the length of the drum or of less length, if desired, and a tube of any desired diameter may be made by selecting a drum of proper diameter upon which to form the tube.

The means for driving the drum, the form of the pressure device and the means for applying the heat may, of course, be varied from what is shown without departing from my invention.

I claim as my invention:

1. A machine for manufacturing insulating tubes comprising a rotary drum to receive successive layers of sheet material, a pressure device located above said drum and having a pressure surface of inverted V-shape that engages said material along two lines of contact only, and means for heating the material as it is wound upon the drum.

2. A machine for manufacturing insulating tubes comprising a rotatable, detachable drum to receive successive layers of fabric and binding material, a pressure device having a pressure surface of inverted V-shape that engages the outer layer of wound fabric along two lines of contact, whereby the weight of the device imparts a constant pressure to said fabric and binding material, and means for heating the fabric and binding material as they are wound upon the drum.

3. A machine for manufacturing insulating tubes comprising a drum, means for rotating the same, a pressure device supported solely by the material wound upon said drum and having a pressure surface of inverted V-shape, means for guiding said pressure device and means for heating said pressure surface.

4. In a machine for manufacturing insulating tubes, the combination with a drum adapted to receive successive layers of sheet fabric and means for rotating the same, of a pressure device located above the drum having a pressure surface of inverted V-shape that rests freely upon the material wound thereon, and means for heating said pressure surface.

5. In a machine for manufacturing insulating tubes, the combination with a rotatable drum adapted to receive successive layers of sheet fabric and binding material, of a pressure device comprising two angularly disposed pressure plates that rest freely and equally upon the upper side of the drum or the material wound thereon and means for raising said pressure device out of contact with the drum comprising a lost motion spring connection device.

6. In a machine for manufacturing tubular insulating bodies from sheet material, the combination with a rotatable drum, a pressure device comprising two diverging hollow plates and resting freely upon the material wound upon the drum and means for heating said plates.

7. In a machine for manufacturing tubes from sheet fabric and binding material, the combination with a rotatable drum, of a pressure device above the drum having a pressure surface of inverted V-shape and the weight of which is entirely supported by the material wound on the drum, means for heating said pressure surface, and raising and lowering means for said pressure device that embodies a lost motion spring connection.

8. In a machine for manufacturing insulating tubes from sheet fabric and binding material, the combination with a frame, a shaft journaled therein, and a drum detachably mounted upon the shaft, of a pressure device supported by the material wound upon the drum and having a pressure surface of inverted V-shape, and means for heating said pressure surface.

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

EMIL HAEFELY.

Witnesses:
ALBERT GRAEBER,
GEO. GIFFORD.