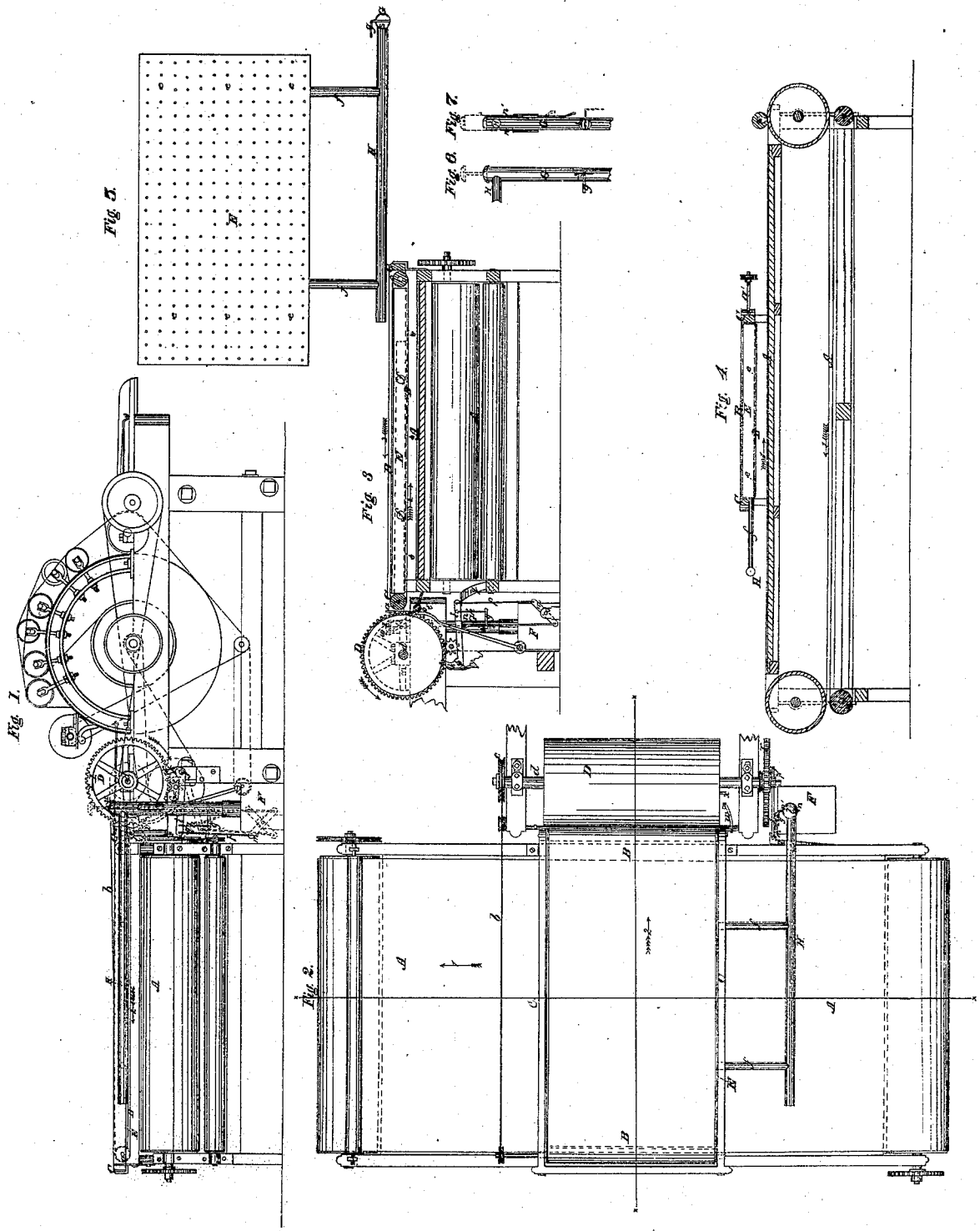
A. C. Arnold.

Forming Bals.

No 8147 Patented Jun. 10, 1851.



UNITED STATES PATENT OFFICE.

A. C. ARNOLD, OF NORWALK, CONNECTICUT.

IMPROVEMENT IN CROSSING THE FIBERS IN FORMING THE BATS FOR FELT CLOTH, &c.

Specification forming part of Letters Patent No. 8,147, dated June 10, 1851.

To all whom it may concern:

Be it known that I, A. C. ARNOLD, of Norwalk, in the county of Fairfield and State of Connecticut, have invented a new and useful improvement in machinery for manufacturing felt cloth of wool, cotton, or other fibrous material, and for carrying webs of any fibrous materials; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of the machinery. Fig. 2 is a plan or bird's-eye view of that part of the same to which my invention relates. Fig. 3 is a vertical section through the line *x x* of Fig. 2, looking from the opposite side of Fig. 1. Fig. 4 is a vertical section through the line * * of Fig. 2. Fig. 5 is a horizontal section of the vacuum-box and tubes communicating with the apparatus for producing the vacuum. Figs. 6 and 7 are sections, taken at right angles to each other, of the vacuum-pipe.

Similar letters of reference indicate corresponding parts in each of the several figures.

My invention relates to a new and improved mode of carrying webs or sheets of fibrous material, and when employed in the manufacture of felt cloth is for the purpose of carrying the weft across and depositing it upon the warp. Felt cloth is manufactured by crossing the fleeces or cardings of wool from two carding-machines, and then pressing, blending, or matting them together into a sheet of compact texture. The warp is carried from one machine on the top of the apron, and the weft, in order to be deposited on the warp, must be carried from the other machine above the warp. The usual mode of conveying the weft across the warp is by means of endless chains carrying combs with hooked teeth, from which teeth it has to be released in order to be deposited on the warp. These teeth frequently allow some portions of the material to fall or slip off too soon, and in consequence of the ineffectual manner in which they perform their duty only certain kinds of material can be employed in the manufacture, as some material—cotton, for instance—cannot be carried by them. They also very frequently cause a broken weft, which produces unevenness and thick and thin places in the cloth. This difficulty I design to obviate by my improvement, which consists in the employment of an apron of some material pervious to air—as, for instance, hair-cloth. Between the rollers of this apron and between its upper and lower folds I place a hollow box or chamber, which nearly fills the entire space. The bottom of this box is thickly perforated all over with small holes, and it communicates by pipes from one or both sides with a fan-blower or other apparatus capable of withdrawing the air and forming a vacuum within. The air being withdrawn from the box, the external air rushes through the apron and through the perforations in the bottom of the box to supply its place, and any light or fibrous material will be drawn toward the apron and securely held under it by the pressure of the atmosphere without any liability to fall off till the desired moment, when, the communication with the blower being suddenly cut off and the air admitted to the box at the same moment, the material is thrown from the apron by the sudden rush of air through the apron in the opposite direction, in addition to its liability to fall by its own weight.

To enable others skilled in the art to make and use my invention, I will proceed to describe fully its construction and operation.

The carding-machine represented in Fig. 1, which supplies the fleece or carding for the weft, does not differ from other machines in use, and therefore needs no particular description here. That which supplies the warp is not shown.

A A (represented of a red color) is the apron which carries the warp, which is the same as usually employed. It moves in direction of the arrows 1, Figs. 2 and 4, and carries the warp on the top.

B B (also of a red color) is the apron carrying the weft, which, as has been before stated, is of material pervious to air. It runs on two rollers, *a a'*, in a frame, C C, supported above the frame carrying the warp-apron. The apron B B receives motion in the direction of arrows 2 2, Figs. 1, 2, and 3, through roller *a'* by a band, *b*, from a pulley, *c*, on the shaft *d* of the doffer D of the carding-machine.

E is the vacuum-box, which is made of any sheet metal, and is of a length nearly equal to the space between the rollers *a a'*, of the

width of the warp and of a depth nearly equal to the space between the upper and lower folds of the apron. Its bottom, perforated all over with holes *e e e e*, touches or nearly touches the lower fold of the apron. A rotary fan in a box, F, is placed near the machine or in any suitable position for operating on several machines at the same time. A pipe, G, proceeds upward from the box of the fan, having a pipe, H, leading from it near the top, which communicates by branch pipes *f f* with the inside of the vacuum-box. In the lower part of the pipe G there is a throttle-valve, *s*, which closes or opens the communication between the vacuum-box E. This valve has a lever, *g*, on its spindle, which is connected by a rod, *h*, to a long arm, *i*, of a lever hung on a fixed fulcrum, *j*, on the side of the frame of the carding-engine, the same lever having a shorter curved arm, *k*, set at nearly a right angle to the arm *i*. The top of the pipe G is open, but is covered by a valve, *l*, having two guide-rods, *n n'*, one on each side, passing through ears on the outside of the pipe. The rod *n'* is elongated below the ear and connected to one arm of a lever, *m*, having its fulcrum in a standard, *o*, and having two arms of equal length, the opposite arm being connected by a rod, *p*, to the arm *i* of the lever, to which the throttle-valve is connected. A spring, *q*, secured to the frame which carries the aprons A A and B B, always bears under the end of the lever-arm *i* and keeps it raised, causing the rod *p* to raise the end of the lever *m*, to which it is attached, and throw down the opposite end, causing the rod *n* to close the valve *l* until it is opened by the means hereinafter shown in the description of the operation of the machine. The throttle-valve *s* is so arranged that it is always open when the valve *l* is closed, so as to leave a free communication from the box E through the pipes *f f* H G to the box F containing the fan, or to any apparatus that may be employed for producing a vacuum.

I is a toothed wheel on the doffer-shaft, through which the doffer receives its motion. It carries a small stud, *r*, on its outer face, which, during the revolution of the wheel, strikes the arm *k* of the lever *i k*. *a t* is a flap composed of a flat board or plate of the whole width of the doffer. It is hung on pivots or hinges *v v* on each side of the frame. It also has a lever, *w*, attached to one end, which is struck by a pin, *x*, on the end of the doffer once during its revolution, so as to throw up the flap suddenly toward the apron B B.

The operation of the machinery, except as far as the mode of confining the weft below the apron is considered, is the same as in other machines employed for the same purpose. Therefore, I will proceed to describe the manner in which the weft is controlled.

The fan or other apparatus for producing the vacuum must be constant in its operation, so as to keep a constant draft or rush of air through the apron in the box E. The doffer makes one revolution for every sheet of weft that is formed, and therefore must correspond in diameter with the width of the warp. The warp travels a distance equal to the width of the weft during the time the weft is traveling across its upper face. The motion of both aprons is continuous, and the carding is taken from the doffer in the usual manner, from whence it proceeds to the under surface of the apron, where it is confined by the pressure of the atmosphere. The speed of the apron B B is such as to take a sheet of carding produced by one revolution of the doffer D and carry it to a proper position for depositing on the warp during the time the warp moves a distance equal to the width of the weft. There is a space left in the card on the doffer, which causes a break in the carding when a sheet is formed of the proper length; and as soon as this space comes opposite the apron the pin *r* on the wheel strikes the arm *k* and throws down the arm *i* of the lever *i k* to the position shown in Fig. 1 in red lines. The rod *h* instantly closes the throttle-valve *s*, and closes the communication with the apparatus producing the vacuum, and the rod *p* acting on the lever *m* causes the rod *n'* to open the valve *l*, both valves being actuated simultaneously. Thus the sheet is thrown from the apron B B suddenly, and deposited on the warp by the sudden current of air, which rushes through the top of the pipe G, escaping through the bottom of the box E and through the apron. The valves remain in the position last shown but an instant or a very short space of time, for as soon as the pin *r* passes the arm *k* the spring *p* raises the arm *i* and brings the valves to the position first described, the air entering the vacuum-box E through the apron B B, the space in the doffer on which there are no cards having then passed the take-off. The carding or web again commences being given off from the doffer, and the end falls to the flap *t*. Just at this moment the pin *x* strikes the lever *w* and throws up the flap, throwing the carding up to the apron, where it is retained, and the operation proceeds, as before described, the flap falling after the pin *x* passes the lever. This mode of carrying webs may be employed effectually for any fibrous material, and will be found advantageous from its not injuring, perforating, or tearing it.

What I claim as new in my invention, and desire to secure by Letters Patent, is—

1. The employment, for the purpose of carrying webs, sheets, or layers of any fibrous material, of an apron, B B, of material pervious to air, having a box, E, in which a vacuum is produced, placed at the back, the side of the box next the apron being perforated or otherwise rendered pervious, so that the external air rushing through the apron to fill the vacuum within the box forces the material close to the apron and confines it there, in combination with the manner herein described

of throwing off or releasing the material from the apron by suddenly closing the valve *s* in the pipe G, communicating between the box E and the apparatus for producing the vacuum, and at the same time opening the valve *l* in the said pipe to admit air into the box, or by any means substantially the same.

2. The flap *t* operating in the manner and for the purposes substantially as herein specified.

ALONZO C. ARNOLD.

Witnesses:
O. D. MUNN,
S. H. WALES.