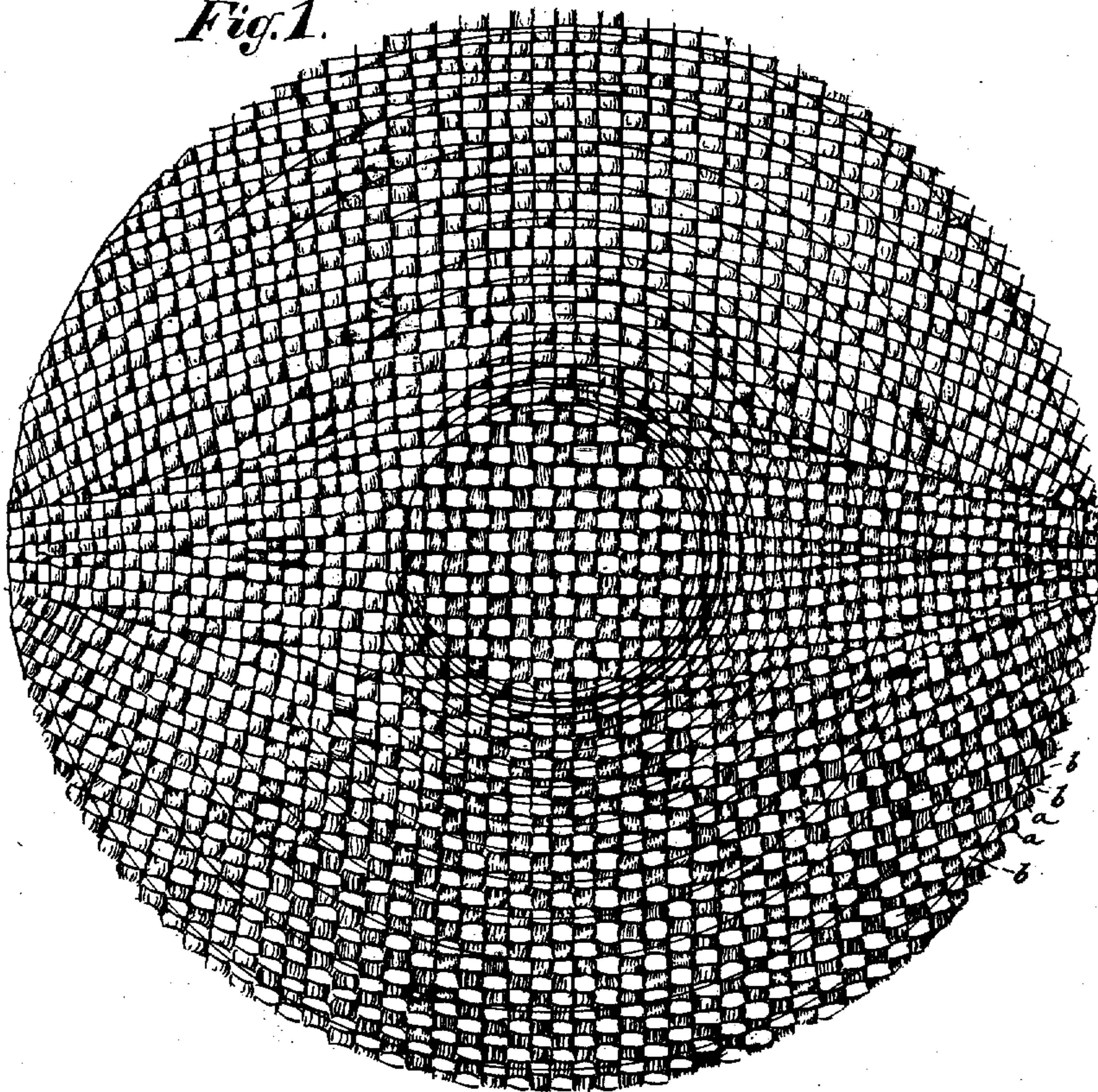
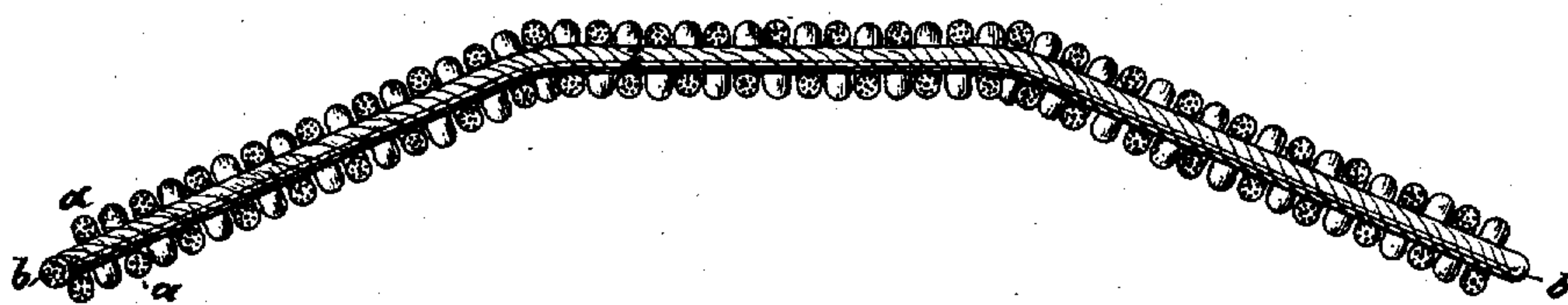


B. L. STOWE.  
Diaphragm for Air or Vacuum Railway-Brakes.  
No. 221,980. Patented Nov. 25, 1879.

*Fig. 1.*



*Fig. 2.*



*Witnesses:*  
*Henry Eichling*  
*Jerome Griffin*

*Inventor:*  
*Benjamin L. Stowe*

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Fig. 6.

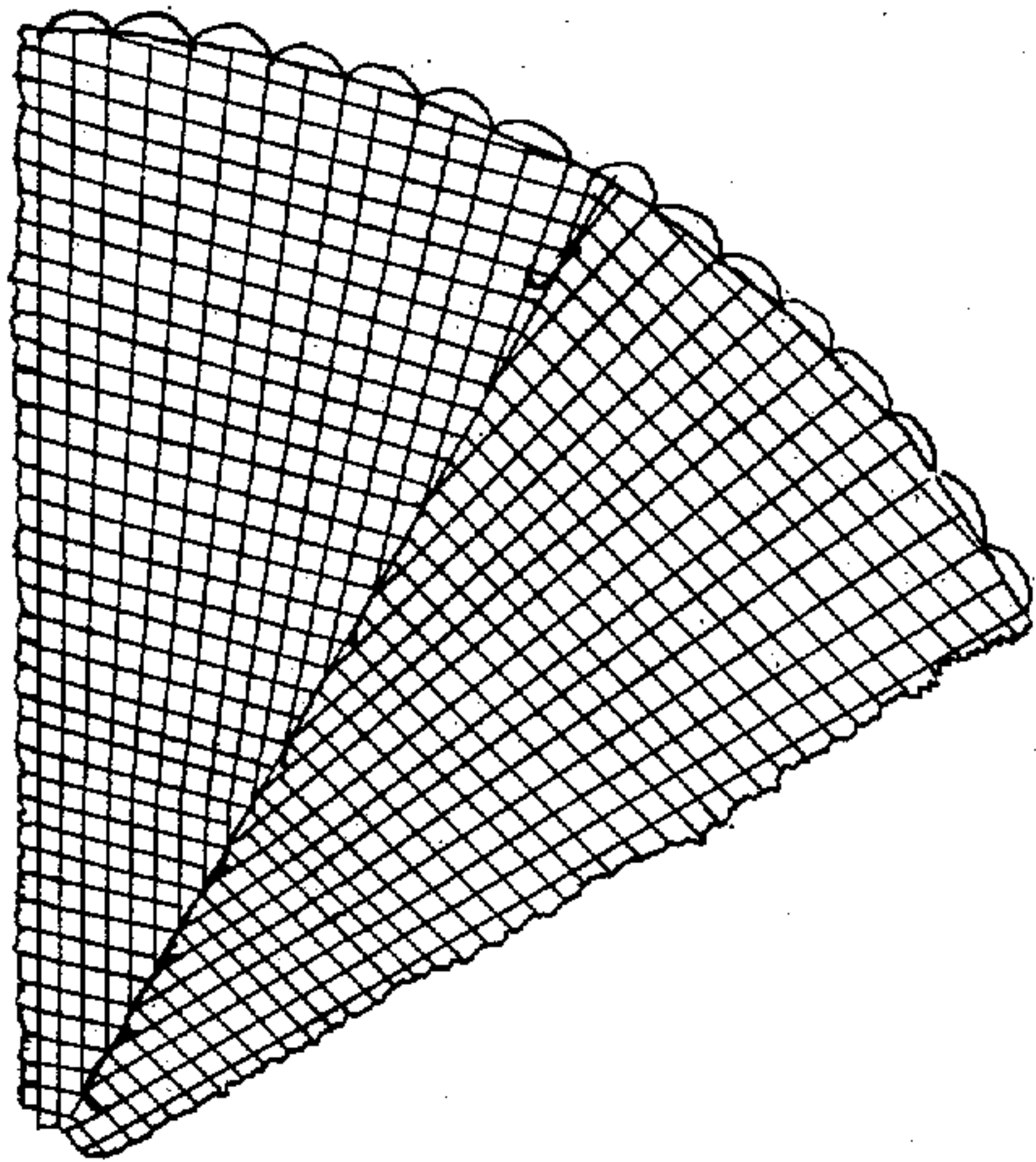
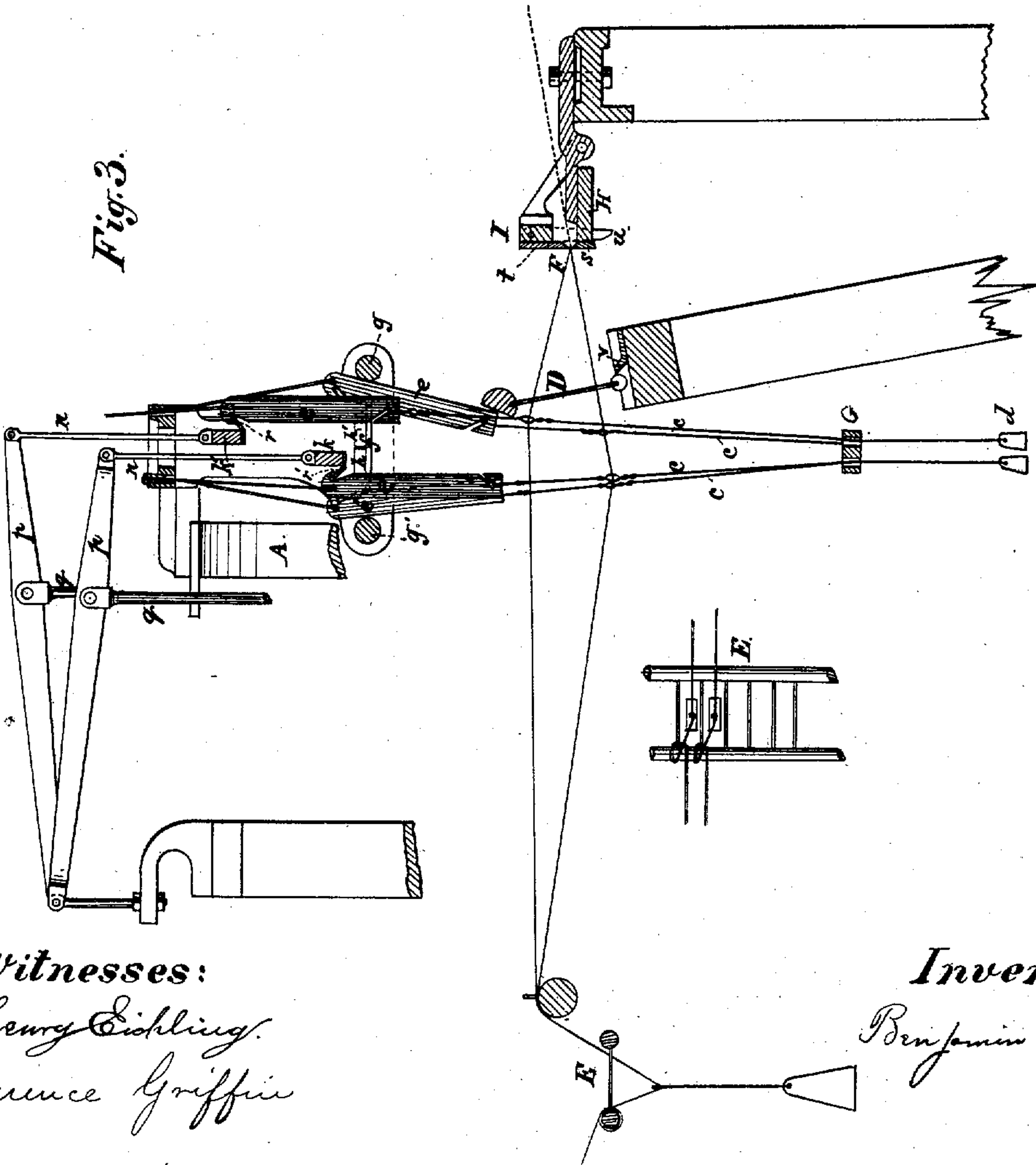


Fig. 3.



Witnesses:

Henry Eichling.  
Frederic Griffin

Inventor:

Benjamin L. Stowe

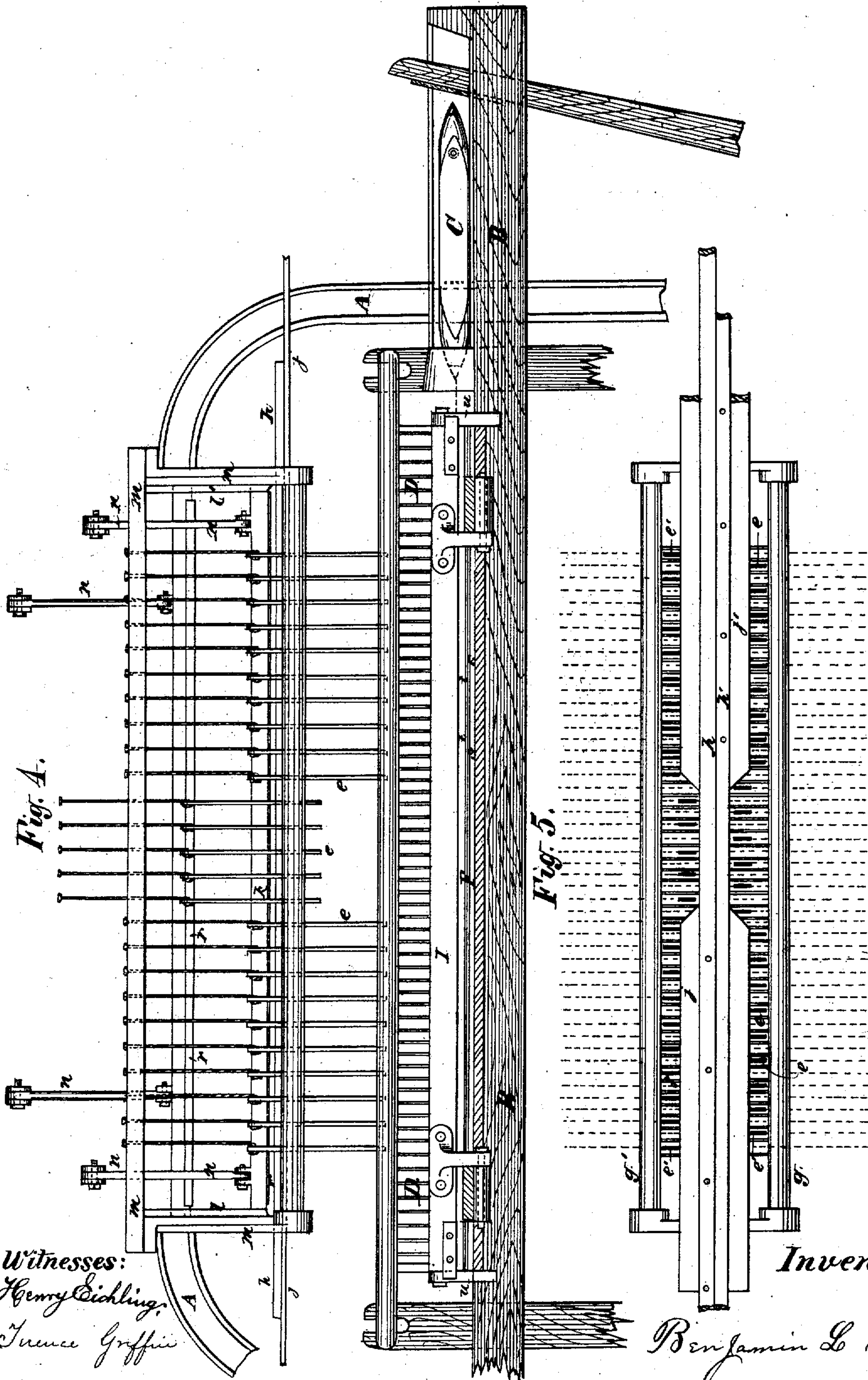


B. L. STOWE.

# Diaphragm for Air or Vacuum Railway-Brakes.

**No. 221,980.**

**Patented Nov. 25, 1879.**





# UNITED STATES PATENT OFFICE.

BENJAMIN L. STOWE, OF NEW YORK, N. Y., ASSIGNOR TO JOHN VAN DEUSSEN REED, OF SAME PLACE.

## IMPROVEMENT IN DIAPHRAGMS FOR AIR OR VACUUM RAILWAY-BRAKES.

Specification forming part of Letters Patent No. **221,980**, dated November 25, 1879; application filed January 8, 1879.

*To all whom it may concern:*

Be it known that I, BENJAMIN L. STOWE, of the city of New York, county and State of New York, have invented a new and useful Improvement in Diaphragms for Air or Vacuum Railway-Brakes, of which the following is a specification, reference being had to the accompanying drawings, forming part of the same.

My improved diaphragm is composed of a seamless woven fabric, shaped during the process of weaving into the form in which it is intended to be used, whereby the liability of bursting at the seams, which is encountered and often happens in rubber diaphragms now in use, is obviated.

In the drawings, Figure 1 is a plan of my improved seamless diaphragm. Fig. 2 is a sectional view of the same across its center, *a a* being the warp-strands and *b* the filling. Fig. 3 is an end sectional view of portions of a loom upon which my seamless diaphragm may be woven. Fig. 4 is a front face view of the same with the lower part broken away. Fig. 5 is a plan of a smaller portion of the same, and Fig. 6 is a plan of a portion of a modification of my improved diaphragm.

My improved diaphragm may be woven upon an ordinary straight loom possessing such alterations and modifications as hereinafter described.

In the machine employed in constructing the diaphragm the frame *A* is retained, also the lathe *B*, the shuttle *C*, the reed *D*, and the heddles *c* of a plain loom are retained; but there is substituted for the warp-beam a separate spool and an independent and automatic tension, *E*, for each warp-strand used.

The warp-spools may be placed upon any suitable spool-rack. The mechanism for forming the warp-sheds is also novel, being so arranged that the desired form may be given to the diaphragm, but without using the cumbersome Jacquard movement usually employed when an irregular movement is desired to be given to the warp-sheds.

I have dispensed with the cloth-beam, and use in its stead the clamp *F*, and the necessary mechanism for operating it.

*c* are the heddles, their lower ends passing

through holes in the bar *G*, and having small weights, *d*, attached to them at their lower ends. These heddles at the top are attached to thin plates, *e*, having hooks upon one side, and by these hooks the plates are suspended in two rows (the hooks of the two rows facing one another) from the frame *m* by means of a cord or wire.

An ordinary reed, *f*, of the same number as that employed upon the lathe is placed horizontally between the two rods, *g g'*, and in each dent of this reed is placed one of the hooked plates *e e'*, alternate plates being placed with their hooks in opposite direction.

Between these two rows of plates *e e'* and above the reed *f* are two long sliding rods, *h h'*, to each of which is riveted a thin plate, *j j'*. Above the rods *h h'* are two bars, *k k'*, the ends of which enter vertical slideways *l l'* cut in the frame *m*, and are free to be moved up and down by the operation of the connecting-rod *n*, levers *p*, rods *q*, and shafts or eccentrics upon the usual cam-shaft. Each of the horizontal bars *k k'* has a lip, *r*, upon its lower and outer side, this lip extending outward far enough to catch the hooks of the plates *e e'*, except when the wide plates *j j'* shall have pushed them considerably away from the center of the reed *f*.

The sliding rods *h h'* and plates *j j'* may have an automatic indicator attached to them, for the purpose of operating them to give a desired form to the article to be woven; but, as shown in the drawings, it is intended that they shall be operated by hand. When the plates *j j'* are drawn out, the hooked plates *e e'* hang in nearly a direct line from the frame *m* to the rod *G*, so that the lip *r* coming down with bars *k* or *k'* strikes their rounded upper corner, and crowds them away far enough to pass below their hooks and engage them, so that they will be carried up with the bar *k* or *k'* when it rises, and will continue to rise and fall with the bar until the beveled end of the plate *j* or *j'* shall have been pushed in far enough to crowd the hooks away from the lip *r*, and freeing them allow them to remain down.

The clamp *F* consists of two thin strips of steel, *s* and *t*, having sharp edges, which meet



directly in front of the weaving-point. The lower one, *s*, is attached to a stationary bar, *H*, and the upper one, *t*, to a hinged bar, *I*. At each end of this hinged bar *I* is a vertical pawl, *u*, and upon the lathe *B*, just below the level of the shuttle-race, is a small inclined projection, *v*, arranged so as to strike the pawl *u*, and raise the upper jaw, *I*, of the clamps a little before the reed *D* completes its forward movement, but to allow it to drop over, and the upper jaw to fall, just as the beater reaches its extreme forward position. As the reed *D* recedes the pawl *u* is free to be drawn backward, and over the projection without lifting the upper jaw. Now, if it is desired to weave a diaphragm, sufficient warp-strands to weave it at its greatest diameter must be threaded into the loom by passing the ends of the warps from the warp-spools through the automatic tension *E E*, as shown in Fig. 3, and eyes of heddles *c*, then through the reed *D*, and between the jaws *s t* of the clamp *F*, and securing them at the front of the loom. The sliding plates may then be advanced, so that but few of the hooked plates (and consequently warp-strands) will be raised by the bar as it rises, and the shuttle is thrown, and a weft deposited in under the warps so raised. The reed then advances and beats the work, and the jaws *t* of the clamp *F* being raised by the pawl *u* and projection *v* just as the beater strikes the weft deposited, the weft is driven through the clamp *F*, and, the clamp closing at the moment that the reed is in its extreme forward position, the weft is held upon the front side of the clamp.

The next pick will employ the same number of warp-strands as the first, being the alternate-strands, and the operation of beating will be repeated. Before the next pick the sliding pieces *j j'* will be withdrawn a little from the center, and as many more warps as are required to weave the increased diameter of the diaphragm will be raised, and the weft will be beaten, as before, and so on, until all the warps are engaged.

It is obvious that much more work has been woven at the center than at the sides of the loom; but the beater *D* and clamp *F* have at all times maintained a straight weaving-line, consequently the fabric is gathered in an irregular form in front of the clamp *F*.

The next operation is to give the required dish-shaped form to the diaphragm, which is done by gradually advancing the slides *j j'*, and employing a few less warps at each pick,

until but a small number at the center are engaged, and then as gradually withdrawing the slides, until all are once more employed. The result of this is to form a sort of gore or *V*, and there are, preferably, three of these *V*'s upon each side of the diaphragm.

The balance of the diaphragm is woven by gradually advancing the slides, and employing fewer warps at every second pick, until it is completed, when another one may be woven in a similar manner.

The independent warp-spools and tension for each strand allows each strand to be drawn in, as required, and the clamp *F*, &c., takes the fabric away, whatever its form.

A diaphragm, Fig. 6, may also be woven upon the same machine by beginning to weave upon a line drawn from the center of the diaphragm to its outer periphery upon one side, and then by throwing in a constant succession of *V*'s, which shall reach from one side to the other in such a manner as to make one side much longer than the other. This operation may be continued until sufficient length is woven to allow the two ends to be joined by a single seam, or double that length may be woven, and a double diaphragm made by securing the two ends.

This process will make a diaphragm of the desired form with one seam, and a small hole through its center, and with a selvage-edge about the outside, as well as about the hole through its center.

There are, I believe, novel and patentable devices indicated in the above description of the machine, for which it is my intention at some future time to apply for Letters Patent.

It is obvious that a Jacquard or some similar movement may be employed to give the requisite motions to the warp-strands if it is desired to weave these diaphragms of more than one ply.

After completion these woven diaphragms may be covered either externally or internally, or both, with rubber.

What I claim, and desire to secure by Letters Patent, is—

A seamless woven diaphragm for air or vacuum air-brakes, having a dish-shaped form, substantially as specified.

Witness my hand this 2d day of October, 1878.

BENJAMIN L. STOWE.

Witnesses:

ALMET REED,  
P. SMITH.