

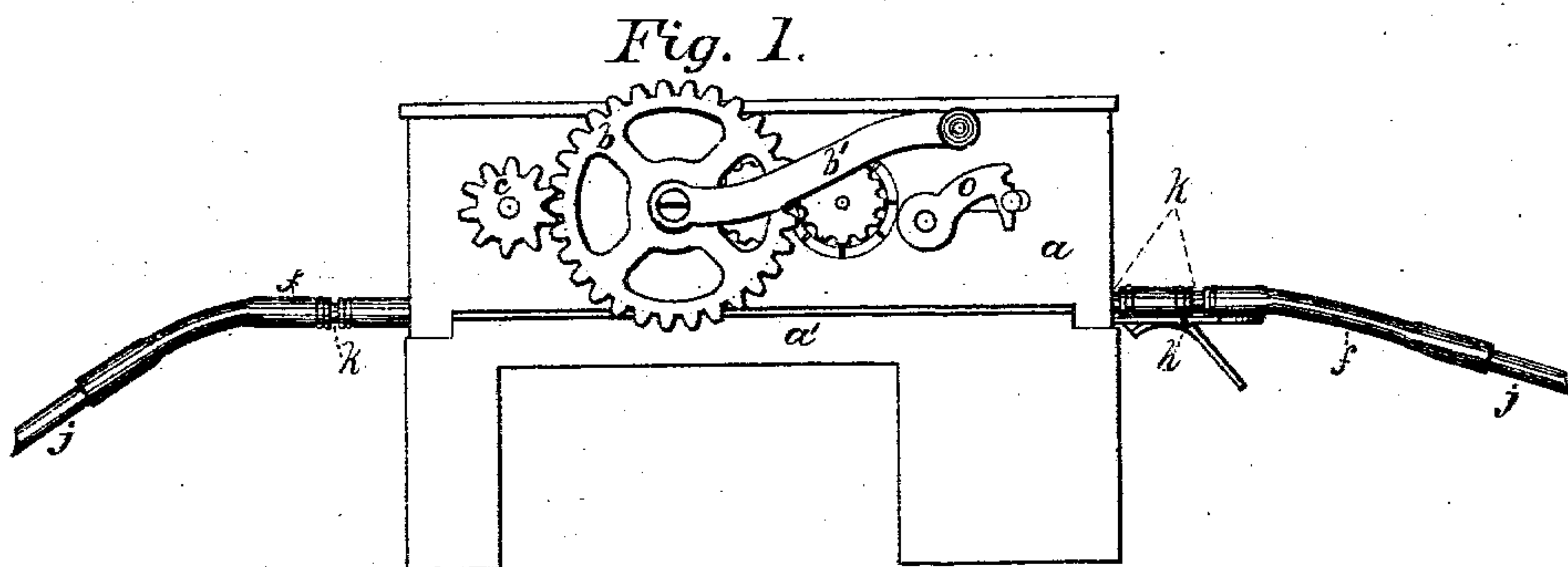
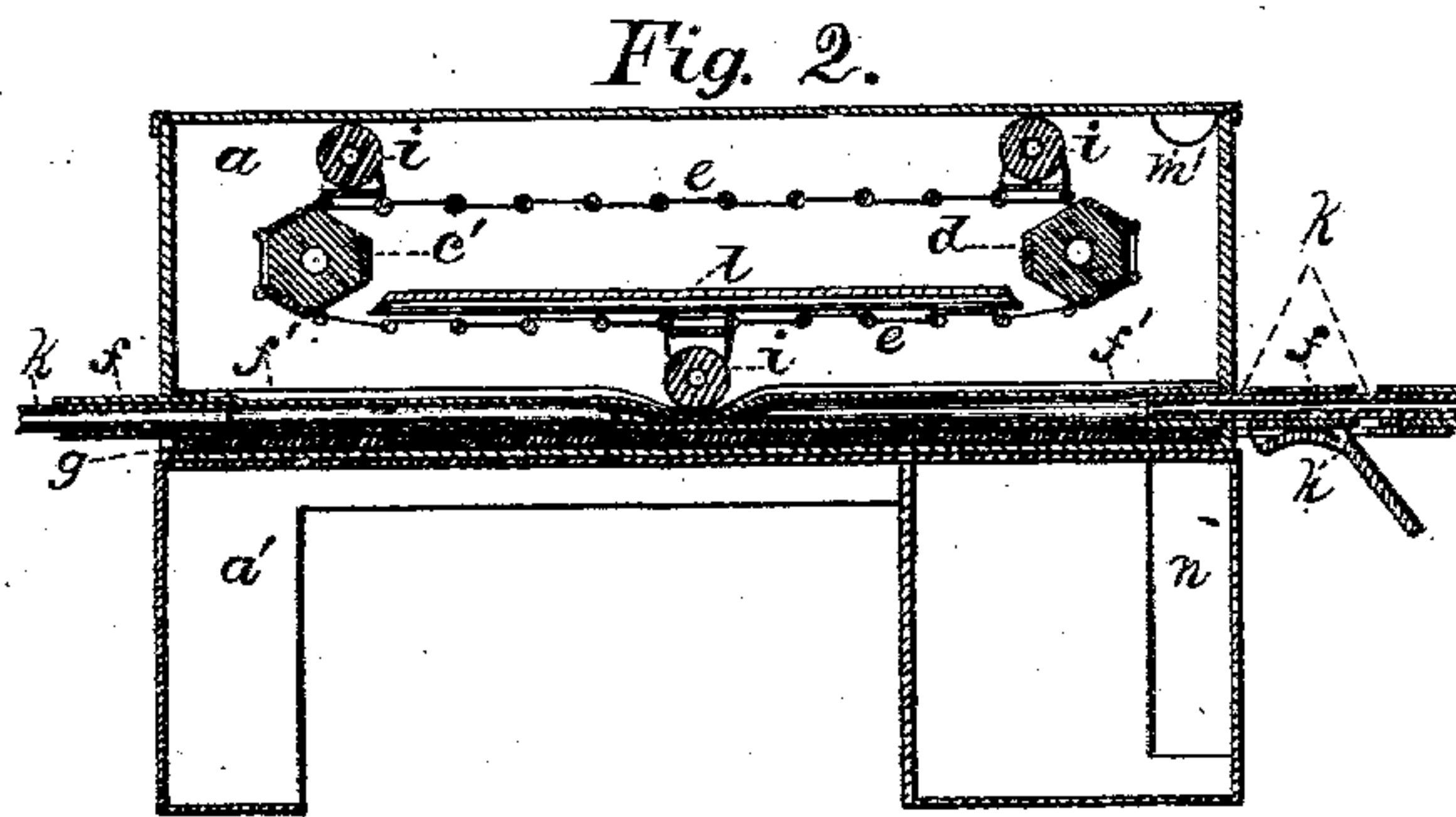
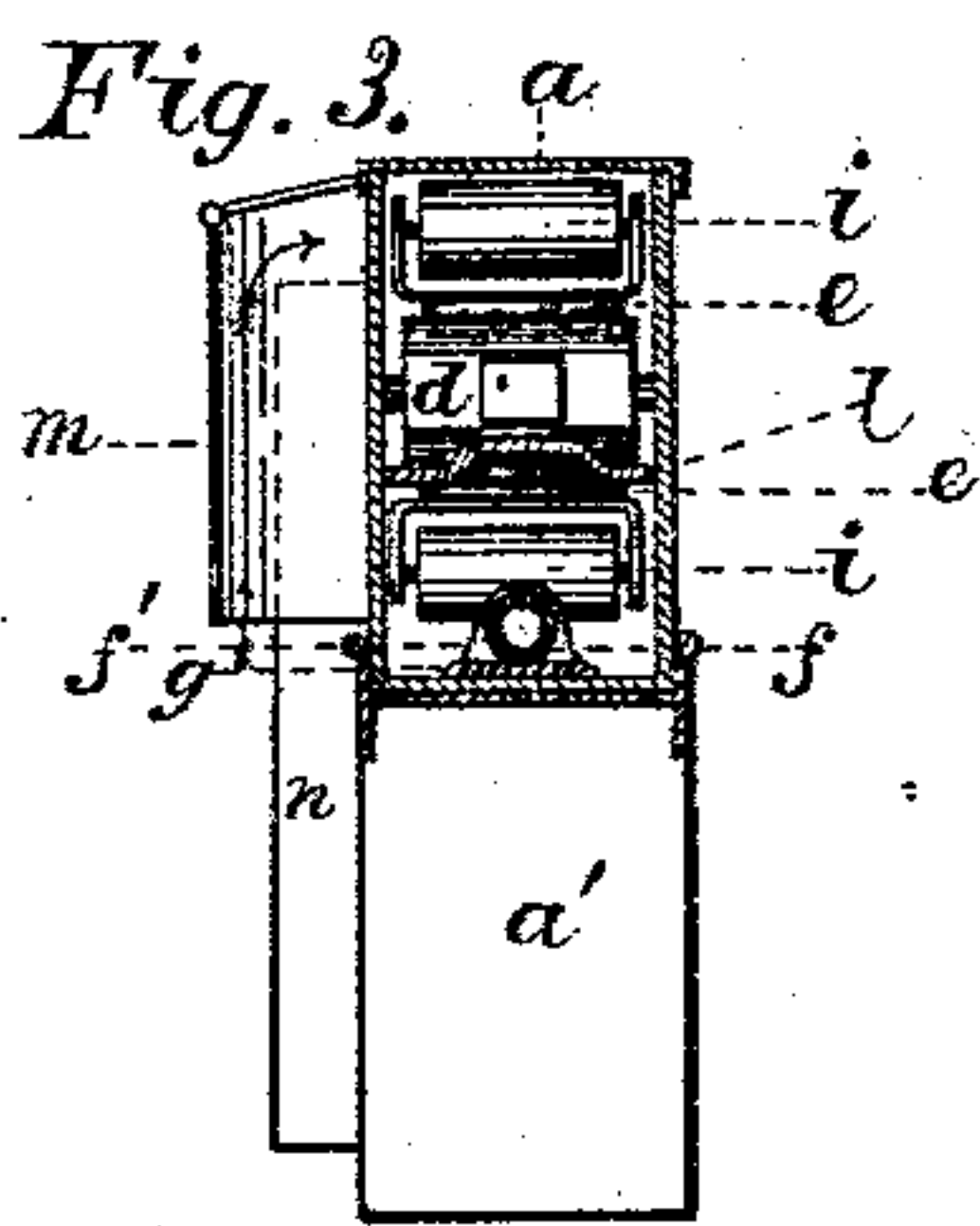
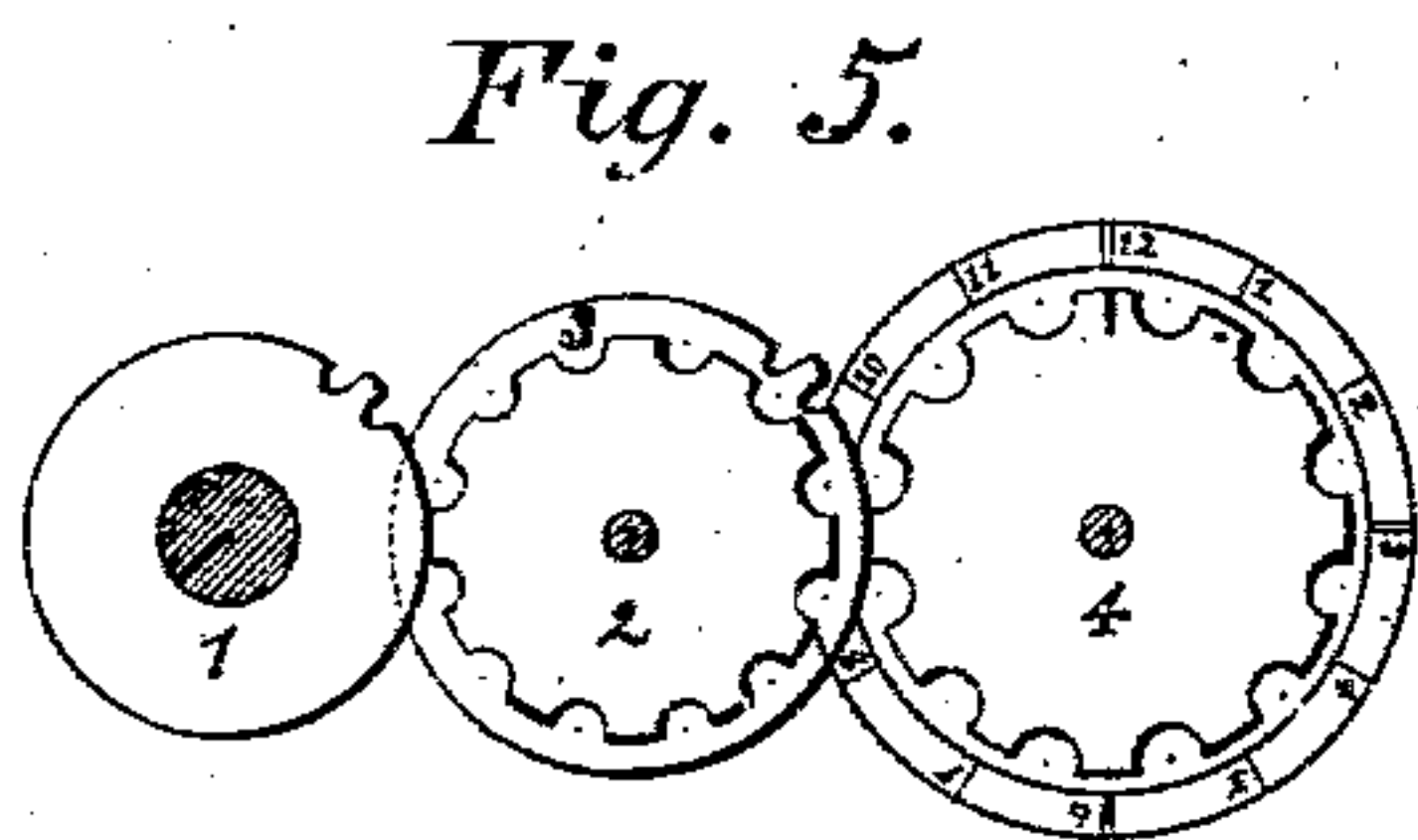
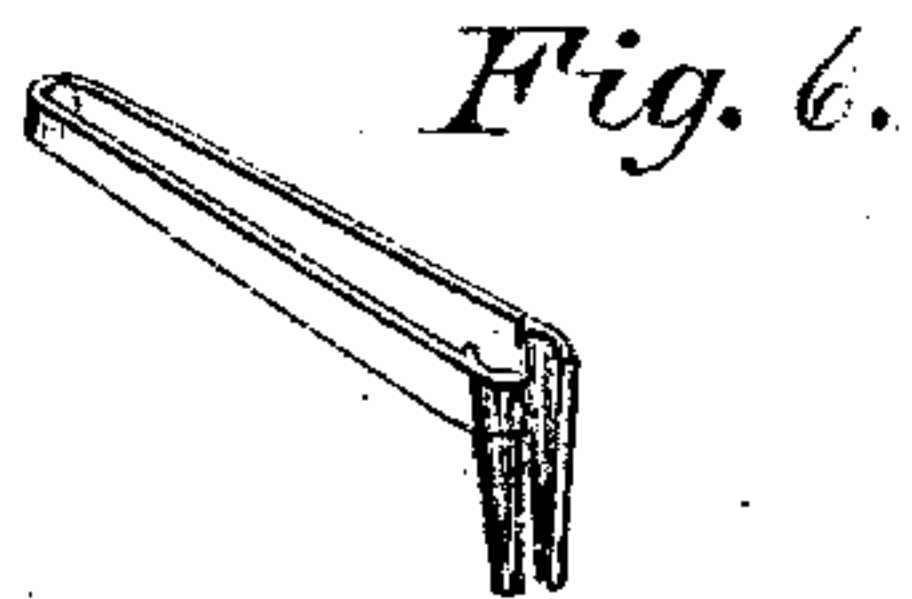
(No Model.)

E. E. ALLEN.

INSTRUMENT FOR TRANSFUSION OF BLOOD.

No. 249,285.

Patented Nov. 8, 1881.



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INSTRUMENT FOR TRANSFUSION OF BLOOD.

SPECIFICATION forming part of Letters Patent No. 249,285, dated November 8, 1881.

Application filed June 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, EUGENE E. ALLEN, of the city of Grand Rapids, county of Kent, and State of Michigan, have invented a new and
5 useful Instrument for Transfusion of Blood, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

Transfusion of blood has not as yet been
10 successfully practiced as a method of treatment for disease, from the fact that the operation has hitherto been attended with great danger to life from the imperfect methods employed, whereby air and coagulated blood have been
15 introduced into the veins of the patient, either of which causes death. Until means are provided by which danger from these causes is entirely removed the practice cannot meet with favor, or even be properly tested.

20 Believing that transfusion of blood, when fully understood and properly conducted, will be successfully employed in the treatment of a large class of cases, my attention has been directed to the invention or discovery of methods and means whereby the operation might
25 be performed with safety to the patient, and the result of my endeavors in this direction has been the production of the within-described apparatus.

30 The leading feature of the apparatus is the elastic hose provided with points of firm material, and furnished with an external propelling agency, whereby the blood is propelled through it by means of a moving pressure applied upon
35 its sides in about the same manner as though stripped through the fingers of the human hand, thus dispensing with all suction-valves, which, on account of the sticky and fibrinous nature of blood, will always clog and produce clots,
40 that must be avoided in an instrument for transfusion of blood.

In the drawings, Figure 1 is a side elevation of my instrument. Fig. 2 is a longitudinal section. Fig. 3 is a transverse section. Fig.
45 4 is a top view with the cover removed. Fig. 5 is a side view of a design for an indicator to be attached to the side of the instrument. Fig. 6 is a perspective view of a pair of clamps or tweezers, the use of which, in connection with
50 the other parts of the instrument, is herein after explained.

The instrument may be connected with an oblong box or case, *a*, about six inches long, one inch wide, and two inches high, and may rest upon a base, *a'*, (from which it may be detached at pleasure,) be constructed of brass or
55 some other suitable material, and plated, if desired. The bottom may be furnished with an elastic cushion consisting of a prepared rubber, *g*, Figs. 2 and 3, which is laid along
60 the bottom, and upon which rests the rubber hose *f*. This hose may be twelve inches or more in length and about one-eighth of an inch in diameter, and extends through the box from
65 end to end. The part which is inside the box is provided with a silk covering, *f''*, which is simply laid along the top and fastened, the use of which is merely to prevent the hose from
70 puckering as the rollers pass over it, as hereinafter described. The ends projecting through the box may be extended to any desired distance. The hose is secured to the box and kept in position by means of short tubes of the
75 same diameter, made of firm material, over which the hose is slipped until it arrives at the proper position, and then the whole is firmly secured to the box at the points of connection, as shown at *k k*, Figs. 1 and 2. Each
80 end of the hose is provided with a nozzle or point of some firm material, which points *j j*, Fig. 1, are to be inserted into the veins being operated upon, as will be described. The box
85 is furnished with a sprocket-wheel, *c'*, Figs. 2 and 4, and a pulley or dummy, *d*, which carry an endless belt, *e*, provided with three or more glass rollers, *i i i*, which are attached to the
90 belt *e* in such a position that one of the rollers constantly rests upon the hose, pressing it firmly down upon the rubber cushion, as shown in Fig. 2.

Motion may be communicated to the sprocket-wheel which propels the chain-belt by a cog-wheel connection on the outside of the box and a crank which is turned by the operator,
(see *b, b'*, &c., Fig. 1.)

95 The tension of the chain-belt is regulated by levers attached to the outside of the box upon either side, which support the dummy-shaft. Instead of producing the tension by means of levers, as described, it may be produced by
100 means of a yoke and set-screw, or in any other suitable manner.

The large leg of the base may be hollow and form a receptacle for alcohol. To this base may be attached a tube, *n*, Figs. 2 and 3, containing a wick and inclosed in a case, *m*, Fig. 3, thus forming a spirit-lamp, which may heat the inside of the box through the flue or opening *m'*, Fig. 2, as indicated by the arrows.

Instead of using the lamp above described, the hose and its contents may be warmed in any other suitable manner.

Attached to the box *a''*, Figs. 1 and 2, is a partition, *l*, dividing the box into an upper and lower chamber, and holding the rollers down as they pass along the under side of it, to prevent them from giving or surging upward by any slackening of the chain-band as they travel along upon the hose when the band is moved forward.

At *h* is an opening into the rubber hose about one-eighth of an inch in diameter, which may be opened or closed with a spring-cover operating upon the same plan as the keys or stops in flutes, clarionets, &c. It may be attached to a platform or projection at the bottom of the box, extended outward a suitable distance, upon which the hose also rests and is attached. This opening or vent is essential to the operation of the instrument, its purpose being to let out air and water from the hose when the instrument is in use, as hereinafter described.

Fig. 5 represents a device which may be attached to the box for the purpose of indicating the number of revolutions of the shaft of wheel *e'*, and consists of four wheels and a dial. Wheel 1, Fig. 5, is attached to a shaft and revolves with it. As it turns the tooth catches in the notch of wheel 2 and moves it forward one notch. When wheel 2 has made a complete revolution the toothed wheel 3, to which wheel 2 is attached, catches in a notch in wheel 4, moving it forward one notch, and thus one hundred and forty-four revolutions of the shaft causes one revolution of wheel 4. By experiment I have ascertained that at this revolution one pound of blood is transferred in a machine of the size indicated.

Fig. 6 shows a pair of clamps or tweezers to be clasped around the points *j, j*, to assist in inserting them into the veins, and after insertion they are to be clasped around the points, inclosing both the points and the veins and secured with slides or some other suitable device to prevent the points from slipping out of the veins during the operation.

To perform the operation of transfusion of blood with this instrument—

First. Fill the hose with warm water by placing one of the points in the water and turn the crank, so as to make a suction from that end. The point nearest the vein I call the "lower" and the other the "upper" point, for the purpose of identification.

Second. Insert the upper point into the vein of the subject from which the blood is to be taken, and the lower one into the vein of the patient, and fasten them securely with the tweezers and clamps.

Third. Light the spirit-lamp, or it may be lighted before, if preferred.

Fourth. Turn the crank backward from one-half to three-fourths of a revolution. This will draw any air which may be at the lower point in the patient's vein backward until it is above the vent, and inasmuch as the blood cannot flow backward in the vein to any extent, a slight expansion of the hose and vein of the subject will be caused.

Fifth. Open the vent with the forefinger, and with the thumb, by pressing upon it, close the hose at the point just below the vent; give the crank a quick motion forward until the pure blood flows from the vein of the subject out at the vent.

Sixth. Instantly close the valve and let go the hose. At the same time continue turning the crank, noting the indicator, until as much blood is transferred as is desirable, which will depend, of course, upon the circumstances of each case. Take care to close the veins properly when the operation is through, so as to prevent the escape of blood.

Blood coagulates very quickly, so as to form clots, when removed from living tissue, either by standing still or becoming chilled; hence my instrument is arranged with a view of passing the blood quickly and without stop, and also to prevent its cooling during the passage; but I do not wish to be confined to the use of the particular device above described.

Instead of the glass rollers for propelling the blood along the elastic hose being attached to an endless chain, they might be connected to a large wheel; or slides instead of rollers might be used, moved by an endless chain, a wheel, or any other device; or the sliding or moving pressure might be produced by other well-known methods.

I am aware that instruments for performing the operation of transfusion of blood have heretofore been used; but I am not aware of any which work upon the principle above described.

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

1. In an instrument for transfusion of blood, an elastic hose, in combination with suitable means for giving the hose a sliding or moving pressure, to produce a continuous forward pressure of the blood into the receiving-vein, substantially as described.

2. The combination, as herein set forth, of the elastic hose, the rollers, and mechanism for operating the said rollers.

3. In an instrument for the transfusion of blood, the elastic hose, without stops, valves, or checks, provided with points and a vent, substantially as described.

4. In the instrument described, the box *a*, provided with cushion *g*, and receptacles for holding alcohol and a lamp, substantially as described.

5. In an instrument for the transfusion of blood, the elastic hose provided with the silk covering *f'*, substantially as described.

6. The combination of the elastic hose provided with the points and vent, the box, the elastic cushion, the rollers, and the operating mechanism of said rollers.
- 5 7. The rollers in the instrument described, in combination with the endless belt, spur-wheels, pulley *d*, and partition *l*, substantially as set forth.
- 10 8. The elastic hose provided with the points *j j*, vent *h*, and silk covering, in combination with the elastic cushion, rollers *i*, belt *e*, spur-wheel *c*, dummy *d*, and box *a*.
9. Box *a*, provided with base *a'*, case *m*, opening *m''*, and lamp *n*, in combination with hose *f*, provided with silk covering *f'*, vent *h*, 15 and points *j j*, and rollers *i*, chain-band *e*, spur-wheel *c'*, and dummy *d*, all substantially as described.
10. An instrument for the transfusion of blood, provided with an indicator, substan- 20 tially as described, for recording the amount of blood transferred.

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