

(No Model.)

2 Sheets—Sheet 1.

E. ANTHONY.

# TENSION DEVICE FOR UNWINDING ROLLS OF PAPER.

No. 259,789.

Patented June 20, 1882.

Fig. 1.

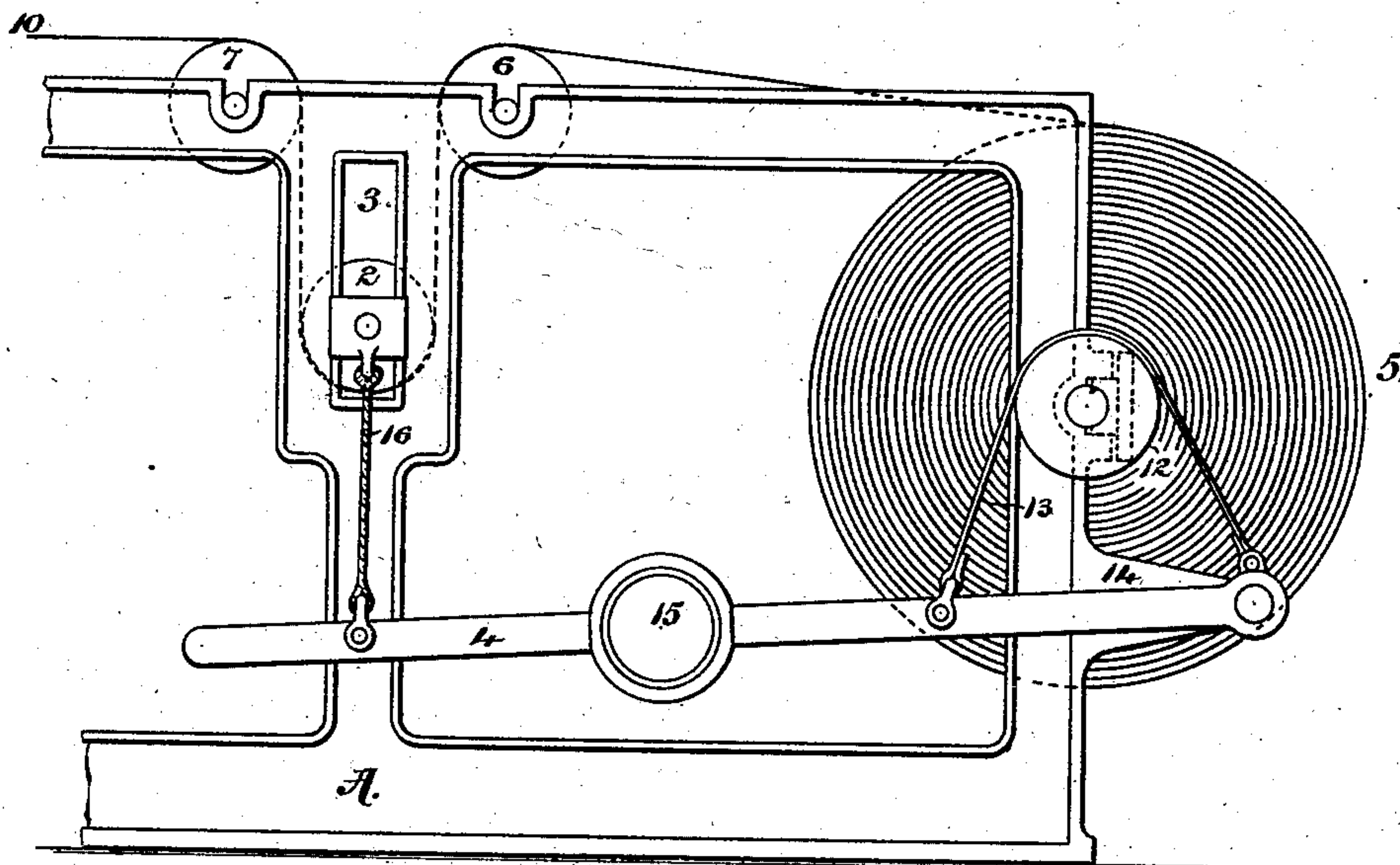
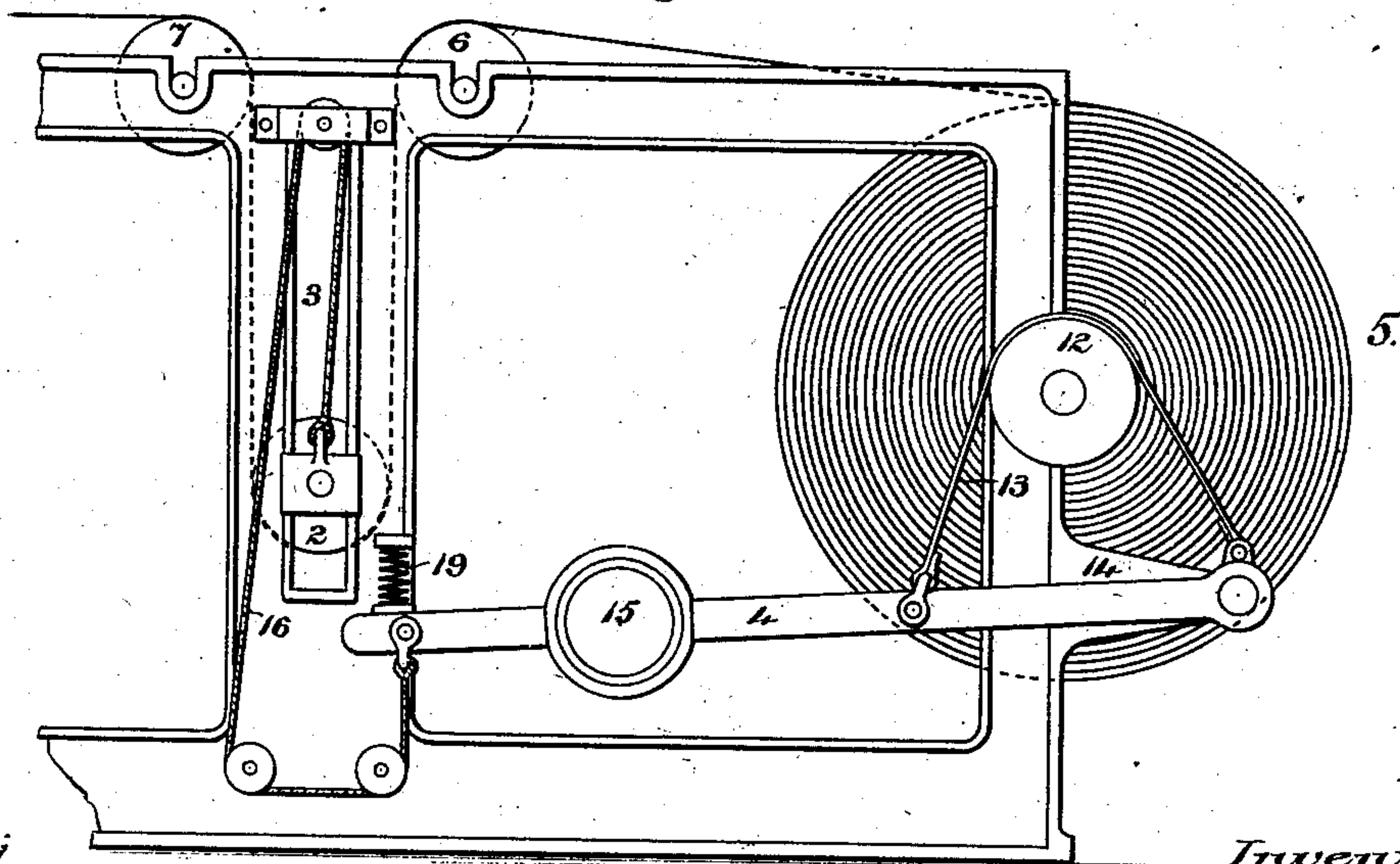


Fig. 2.



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Fig. 3.

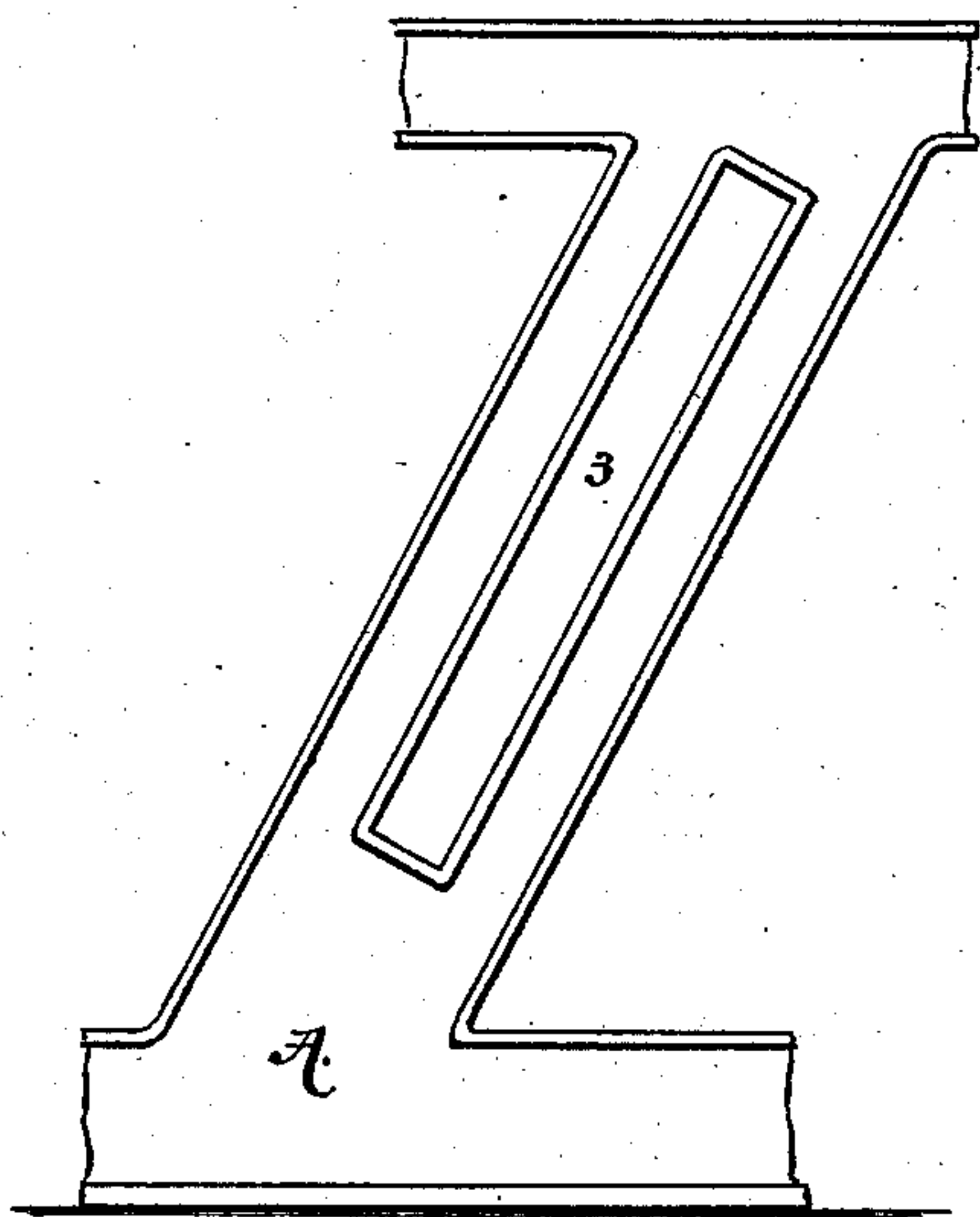


Fig. 5.

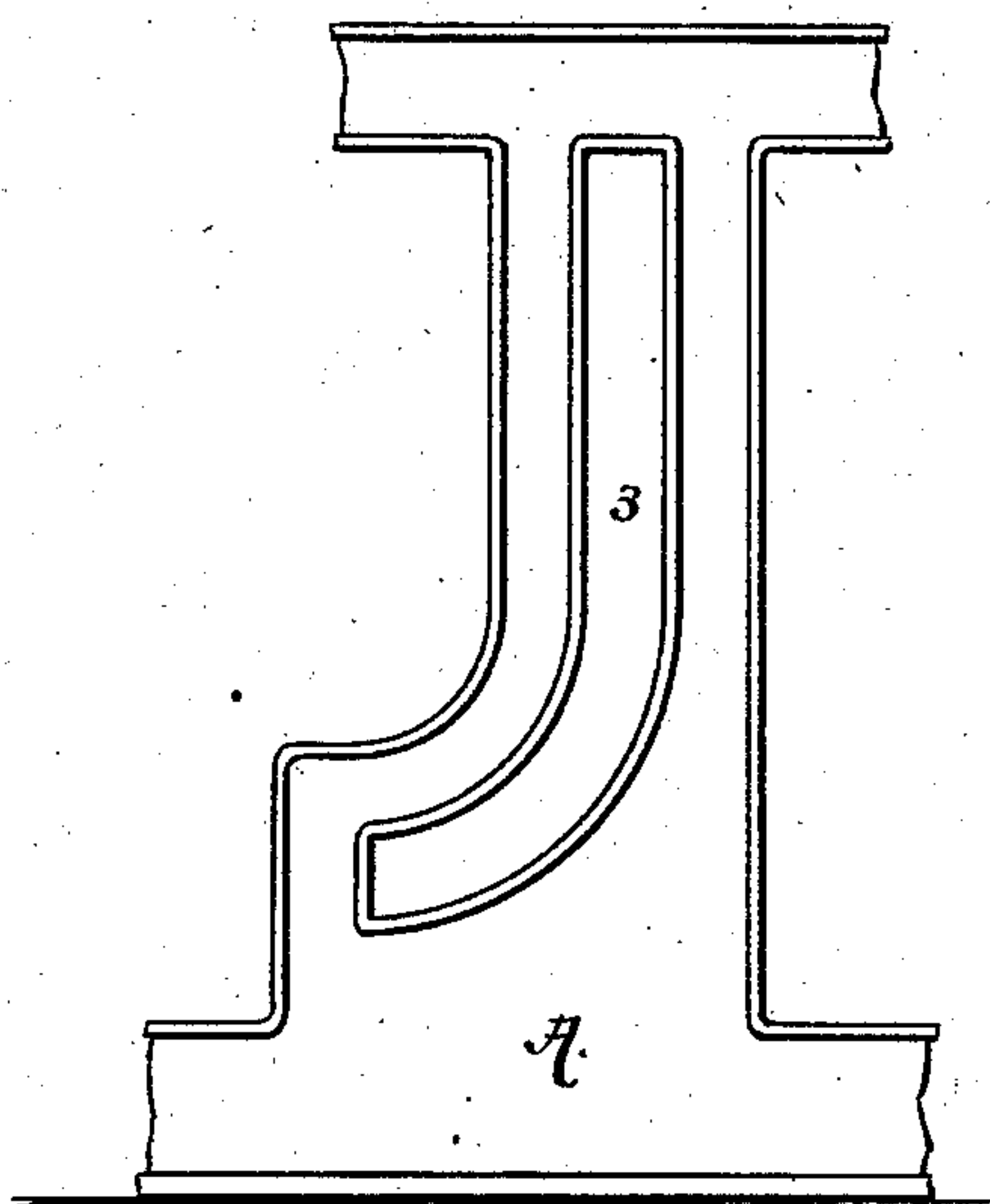
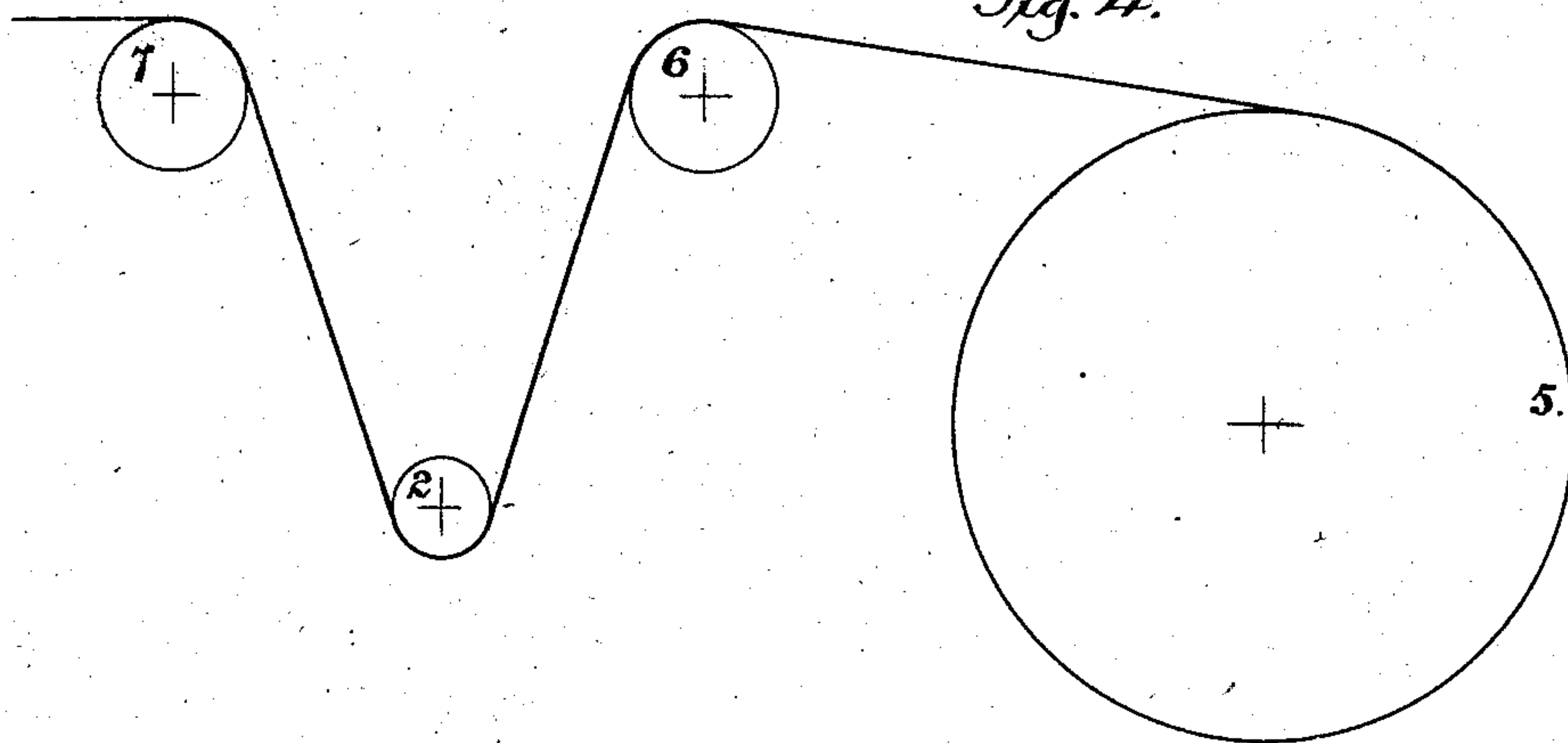


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## TENSION DEVICE FOR UNWINDING ROLLS OF PAPER.

SPECIFICATION forming part of Letters Patent No. 259,789, dated June 20, 1882.

Application filed August 7, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, EDWYN ANTHONY, a subject of the Queen of Great Britain and Ireland and Empress of India, residing in the city of Hereford, county of Hereford, England, have invented certain new and useful Improvements in Tension Devices for Unwinding Rolls of Paper, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

In what are known as "web" printing-machines, in the machines used for damping long rolls of paper for printing purposes, and in machines connected with the manufacture of paper, a web of paper wound round a shaft is unrolled by the motion of the machine, which continuously pulls the free end of the roll, and thus gradually unwinds it. The tension on the paper, as it passes from the roll, depends on the amount of resistance to motion offered by the roll. This quantity is usually regulated by a brake at one or both ends of the said shaft, and it varies a great deal from many causes. For instance, the resistance increases as the diameter of the roll decreases, it changes with any change in the velocity of the machine, and it likewise depends on the condition of the brake, which is, of necessity, not uniform from day to day.

My invention consists in making the tension of the roll automatic—that is to say, in causing it to fluctuate within narrow limits about any required mean amount, and to be practically independent of the size of the roll, of the velocity of the machine, and of the variations in brake-power. I effect this result as follows: I conduct the web under a tension-roller capable of rectilineal or curvilinear motion to and fro at right angles to its axis. This tension-roller is connected with the roll-brake in such a way that its movements cause the brake alternately to act and not to act on the shaft upon which the web is wound. Thus the tension oscillates about some mean point, and its amount depends on the weight of the tension-roller and its appendages.

In Figure 1 I have illustrated a side elevation of a machine embodying my invention in one of its forms, Fig. 2 being a similar view illus-

trating a modified arrangement of some of the parts. These figures represent but one side of a machine; but it will be readily understood that the opposite side frame may be a duplicate of that shown.

2 is a tension-roller, which may freely move up and down in guide-slot 3, provided in the side frames, A, of the machine. This roller is constructed so that it may be weighted at each end, according to the amount of tension desired. On opposite sides of this guide-slot guide-rollers 6 and 7 are journaled. The shaft of the paper-roll 5 is provided with a pulley, 12, over which a friction-strap, 13, is led, said strap being fast at one end to a bracket, 14, and at the other to a brake-lever, 4, that is fulcrumed at one end on said bracket and connected at the other end to the projecting journal-box of the tension-roller 2 by means of a cord or chain, 16. This lever 4 is provided with an adjusting-weight of any common form, as the sliding weight 15. With this arrangement of devices it is apparent that as the tension-roller 2 rises the brake-lever 4 will be raised, while the downward movement of said roller will lower the brake-arm. In the modified arrangement shown in Fig. 2 the brake-lever is so connected to the tension-roller 2, by means of the cord, chain, or strap 16, that the upward movement of said roller, which takes off the brake, is aided by a spring, 19, that is attached to the end of the lever 4 and to a bracket on the side frame.

It being understood that the adjuncts of the tension-roller 2 should be applied either to both ends or to the middle part of said roller, in order to secure uniformity of movement throughout the roller, the operation of the machine will now be described.

The paper passes from the roll 5 over the guide-roller 6, thence under the tension-roller 2, then over the guide-roller 7, and from there through the rest of the machine, which is not shown, because its particular form and the operations it performs on the paper do not affect the invention. The brake is arranged so that when in action the force requisite to make the roll 5 rotate is greater than that which, acting at 10, would cause the roller 2 to rise



in the guide-slot 3. The machine, on starting, gives the paper a pull, and consequently the tension-roller 2 rises, which motion takes off the brake. The resistance to rotation of the roll 5 thus becomes less than that offered by the weight of the tension-roller 2. Hence the roll 5 begins to turn and the tension-roller 2 immediately falls. Thereupon the brake is re-applied and the tension-roller 2 again rises. This continues so long as the machine is in motion, with the result that the tension of the paper alternately somewhat exceeds and falls short of half the weight of the tension-roller 2 and its adjuncts.

It is plain that the above method is applicable whatever be the kind of brake used, the principle of the invention consisting in the employment of a moving tension-roller whose movements are caused by the paper itself, and which have the effect of putting the brake on and taking it off. It is also clear that the connection between the brake and the tension-roller 2 may be made in an indefinite number of ways. For example, this connection may be a cord or strap, and the relative positions of the tension-roller 2 and of the roll of paper 5 may be any whatever. When it is desired to reduce to a minimum the fluctuations of the tension the tension-roller 2 may be arranged so that its movements make and break an electric circuit which produces the magnetism of an electro-magnet fixed so that when in action the brake is applied, and when not, not, or the reverse.

When it is required to have the tension very small the tension-roller 2 may be partially counterpoised; or the slot 3, in which it oscillates, may be inclined to the vertical, as in Fig. 3, so that it will bear a portion of the weight of the tension-roller 2.

In Figs. 1 and 2 the guide-rollers 6 and 7 are horizontal and equal in diameter. Obviously they need not fulfill either condition. In Figs.

1 and 2 the horizontal space between the guide-rollers 6 and 7 equals the diameter of the tension-roller 2. The web, therefore, in entering upon and leaving the tension-roller 2, is parallel to itself, and the tension (except as regards the brake) is independent of the position of the roller 2 in the guide-slot 3. It may sometimes be advisable to make the tension dependent on the position of the tension-roller 2—a result attainable in various ways. For example, the horizontal space between guide-rollers 6 and 7 may be greater than the diameter of the tension-roller 2, as in Fig. 4. The tension will then increase with the rise of the roller 2. If the aforesaid space is less, it would in like case decrease. A similar result may be effected by making the slot curvilinear instead of rectilinear, the shape of the curve depending on the particular object in view. Thus in Fig. 5 the tension would begin very small, gradually increase for a certain time, and then remain constant; or, again, the end may be reached by causing the tension-roller 2, the slot remaining rectilinear, to press as it rises against a spring which offers a constantly-increasing resistance to its motion.

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

The combination, with a shaft carrying a roll of paper and brake acting thereon, of a tension-roller connected to the brake-lever and freely movable in a guiding-slot, whereby variations in the tension of the paper cause movements of the tension-roll, and the latter in turn acts upon the brakes, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWYN ANTHONY.

Witnesses:

T. H. PALMER,  
GEO. H. GRAHAM.