

quently moving outward the outer rollers, M, and by means of the bead *m* in the latter setting the tube tightly out into the channel *c*, forming a tight and reliable junction of the parts B and C.

Modifications may be made in the forms and proportions, while retaining some of the novel principles and realizing some of the advantages of the invention.

Figs. 8, 9, 10, and 11 show modifications in which the tube itself which is being set contributes to support the mechanism. All are central longitudinal sections.

Fig. 8 shows a modified construction and arrangement of the expander and the adjacent parts. The expander is as shown in Fig. 6. The tube *D'*, which operates the mandrel, is allowed to traverse endwise within a short tube of a little larger diameter, which latter is turned by the ratchet-lever *E* and does not partake of the longitudinal motion of the mandrel. In this and in the other forms of the invention shown in the succeeding figures the tube *I* is centered in the tube *B*, which is being set by means of a ring, which is set on the tube *I* in the required position by a pinching-screw. The tube *D'* is compelled to turn with the rotary motion imparted by the ratchet-lever *E* through the medium of a feather, which is fitted in longitudinal grooves, formed one in the exterior of the tube *D'* and the other in the interior of the inclosing-tube.

Fig. 9 shows a hollow screw, *G*, with a hand-wheel, *G'*, as a means of inducing and controlling the endwise movement of the mandrel, a solid rod, *D'*, serving as an extension of the mandrel-rod *D*, extending through such screw and being operated by a ratchet-lever, *E*, the thrust being taken on balls to reduce the friction. The connection between the solid rod *D'* and the tube *D'* is rigid, and is made by a thimble, *D<sup>8</sup>*, into one end of which the tube *D'* is tightly screwed, while the rod *D'* is tightly screwed into the other end. The hollow screw *G*, being adjusted endwise by turning the attached hand-wheel *G'*, moves the loosely-inclosed rod with it, and correspondingly moves the tube *D'* and mandrel *D* endwise.

Fig. 10 shows a screw-thread formed on the exterior of the tube *D'*. On this is mounted a hand-wheel, *G'*, which is connected with the turning mechanism operated by the ratchet-lever. This is effected by a longitudinal key or feather loosely fitted in splines formed in the screw-threaded exterior of the tube *D'* and in the smooth interior of the ratchet-sleeve *D<sup>2</sup>*. The intermittent turning of *D<sup>2</sup>* compels a corresponding turning of *D'* through the medium of the feather. The turning of the hand-wheel *G'* compels the end movement of *D'* through the medium of the screw-threads.

Fig. 11 shows the ratchet-lever operating on the end of the tubular extension *D'* and the end motion controlled by a threaded hand-wheel, *G<sup>2</sup>*.

Figs. 12, 13, and 14 illustrate the apparatus which I propose to use for determining the position in which the flange shall be secured on the tube *I* when either of the modifications shown in Figs. 8, 9, 10, and 11 are employed.

Fig. 12 shows the measuring gage applied to a length of pipe, with one of the connecting-rings attached.

Fig. 13 is a cross-section through the measuring device alone.

Fig. 14 shows the measuring device applied to my expander and the connected mechanism to determine the position of the adjustable flange.

Fig. 15 shows a series of pipe-joints with one ordinary flange and with one joint capable of expansion and contraction.

I propose to make the tube-joint which is heredescribed the subject of a separate application for patent. I believe I can make the joints successfully with a wrought-iron ring and no re-enforces, in place of the cast-iron ring *C* with the re-enforces *C'* which are represented.

A rotary motion from steam-power or other source may be employed in either form of the apparatus in place of the ratchet.

I claim as my invention—

1. In a tube or pipe expander, in combination with the head or housing for the expansion-rollers, a hollow holding-shank attached to the head by a connection adapted to allow rotation of the latter with reference to the shank, substantially as and for the purpose specified.

2. In a tube or pipe expander, in combination with tube *I*, the head or housing for the expansion-rollers, swiveled to the end of the tube, substantially as and for the purpose shown.

3. In a tube or pipe expander, in combination with the head for the expanding-rollers, having a tubular extension provided with a circumferential groove, the tube *I*, the ring or extension-piece on the tube, and the ring within and attached to such piece engaging the groove in the tubular extension of the head, substantially as and for the purpose set forth.

4. In a tube or pipe expander, in combination with the tube forming the holding-shank, the ring or extension-piece on the tube, the head or housing for the expansion-rollers, provided with a hub or tubular extension in which is a circumferential groove, a divided ring fitting in such groove, and means for attaching such ring to the extension-piece on the tube, substantially as and for the purpose described.

5. In a tube or pipe expander, in combination with the head or housing for the expanding-rollers, and the tube connected with the head so as to allow of its rotation, the mandrel having a shank or extension extending through the tube, and means for turning and moving endwise the mandrel, all substantially as and for the purpose specified.



(No Model.)

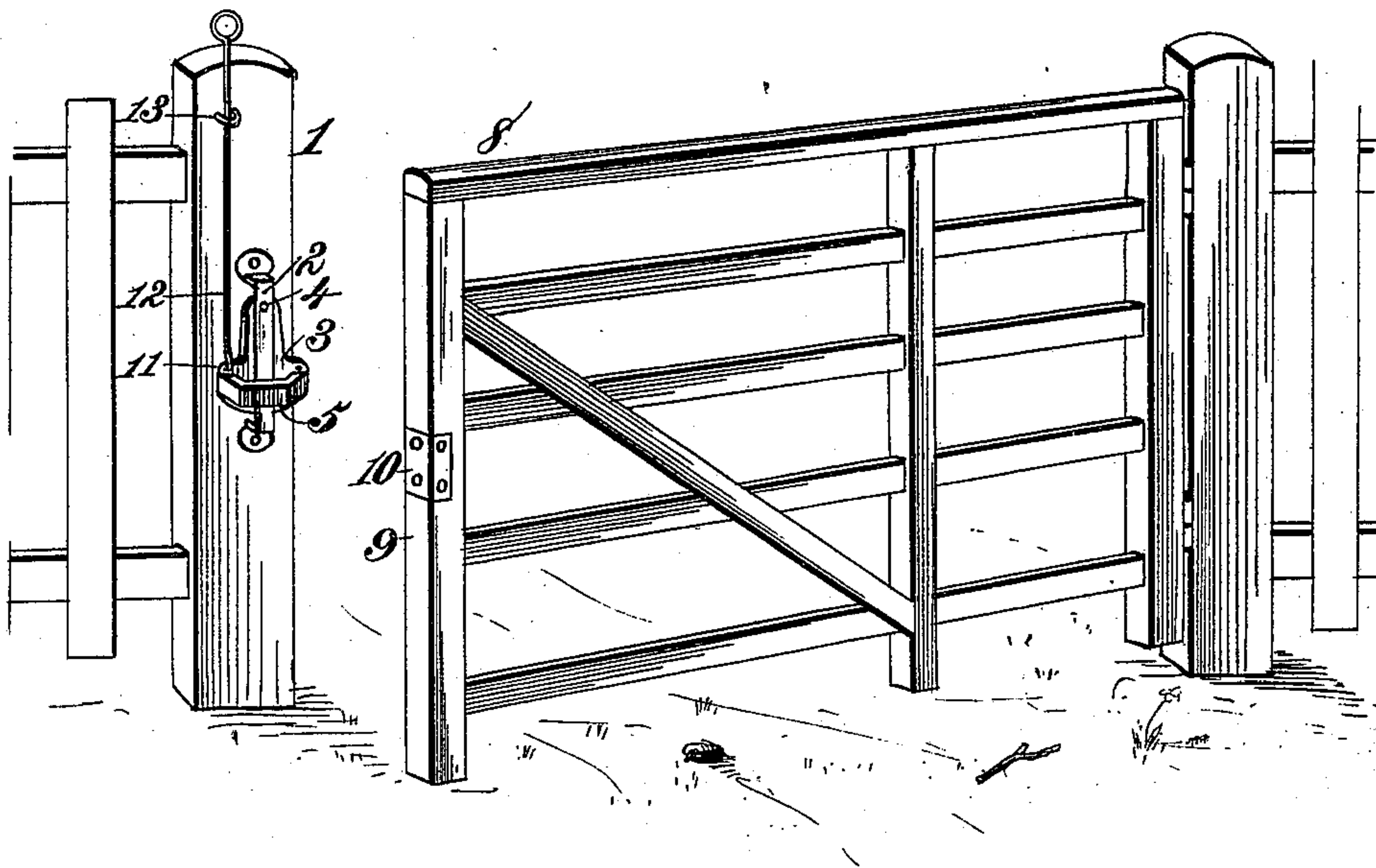
A. S. EWING & J. H. HEITMANN.

GRAVITY LATCH.

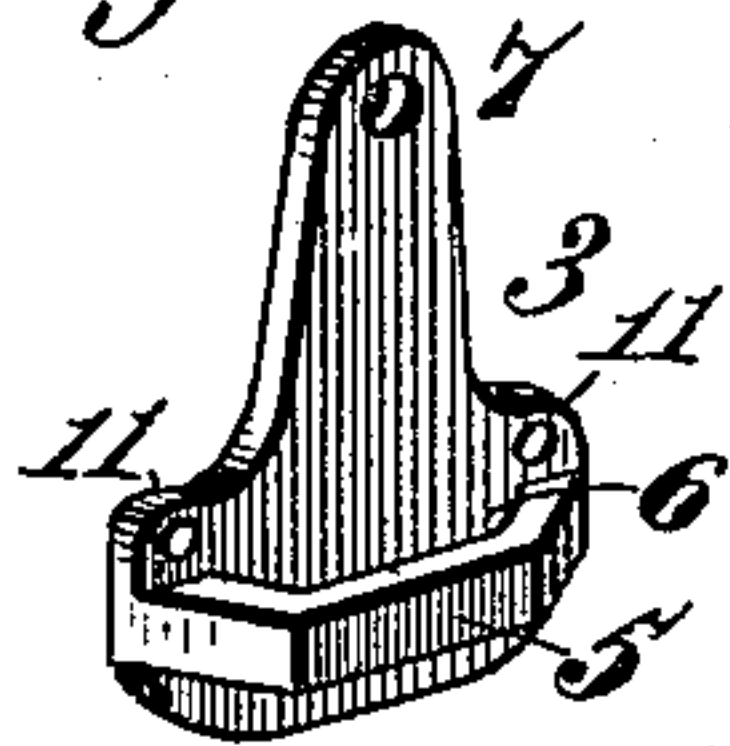
No. 355,645.

Patented Jan. 4, 1887.

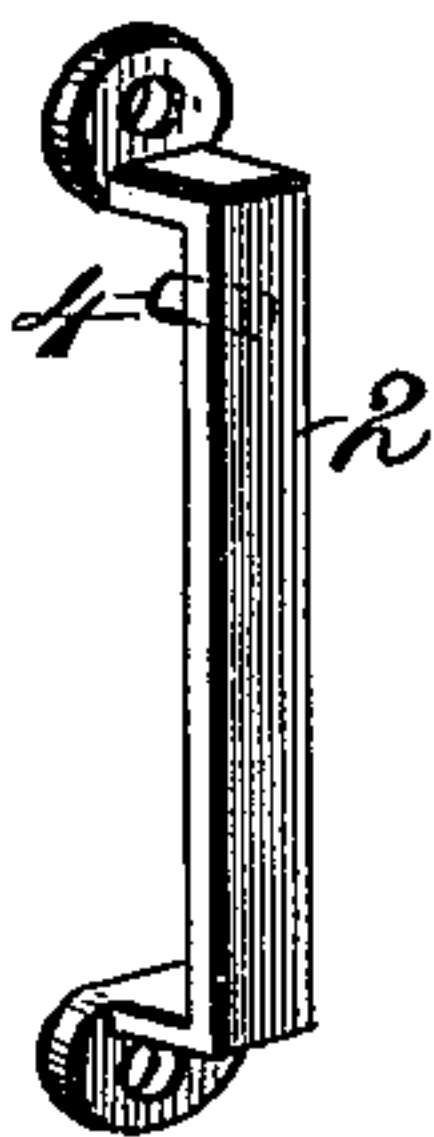
*Fig. 1.*



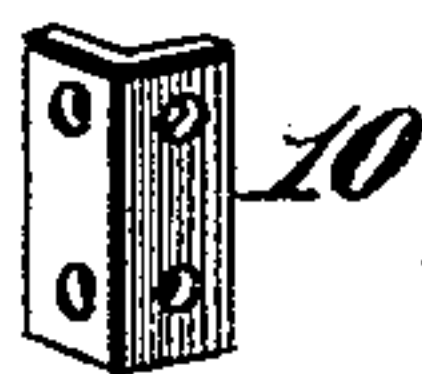
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Witnesses.*

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