

No. 767,364.

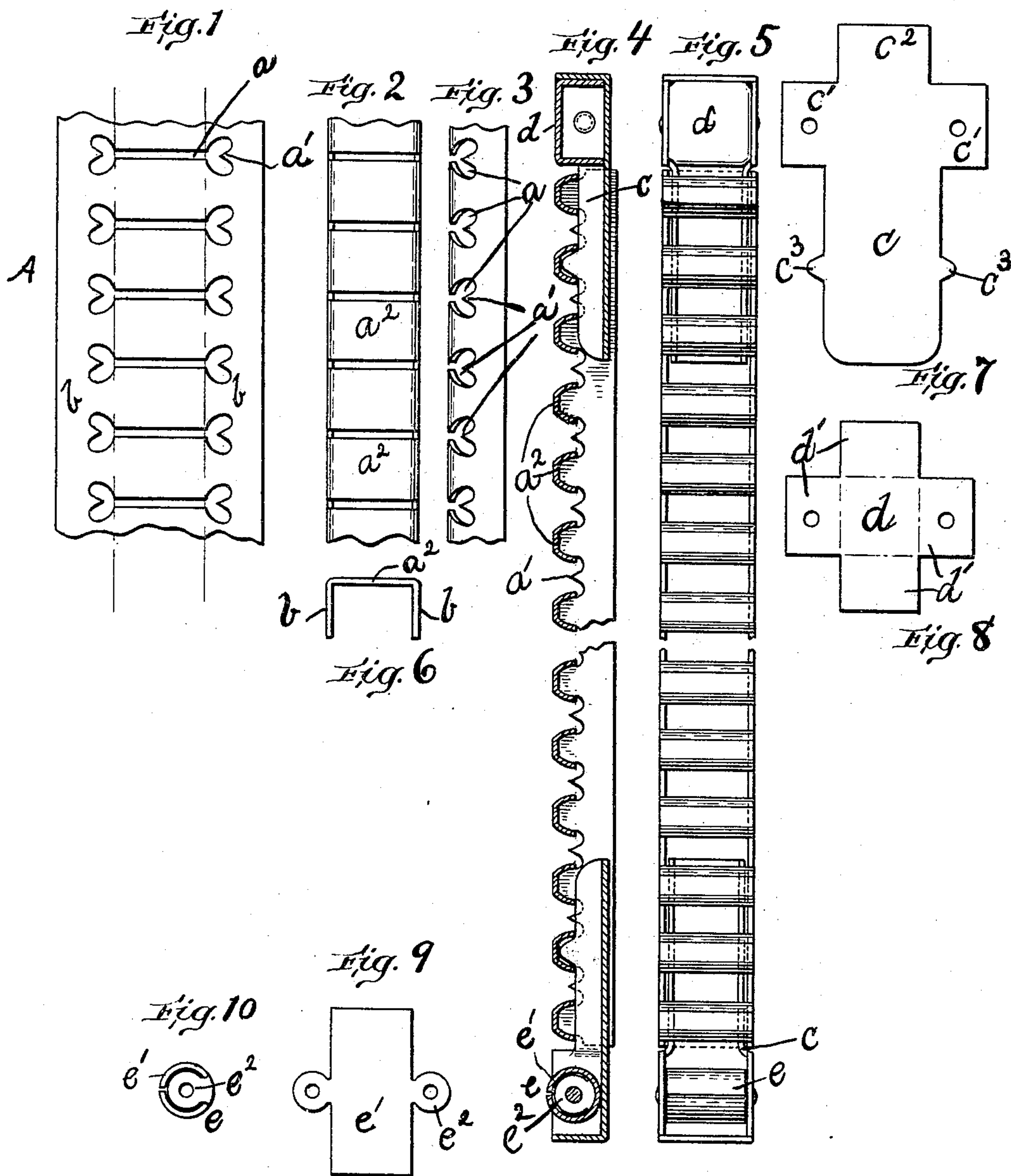
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RACK BAR.

APPLICATION FILED OCT. 22, 1903.

NO MODEL.



Witnesses:

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# UNITED STATES PATENT OFFICE.

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## RACK-BAR.

SPECIFICATION forming part of Letters Patent No. 767,364, dated August 9, 1904.

Application filed October 22, 1903. Serial No. 178,005. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY E. RATHBUN and WILLIAM H. LONERGAN, citizens of the United States, and residents of Providence, county of Providence, Rhode Island, have invented certain new and useful Improvements in Rack-Bars, of which the following is a specification.

This invention comprises an improved rack-bar made of stamped sheet metal, the object being to produce a very light, strong, and durable rack-bar and one that is capable of being made in large quantities at a low cost of production. Besides the stamped-metal rack-bar the invention comprises certain adjuncts or attachments thereto which are especially adapted to fit the rack-bar for use in connection with the type of sash-balance disclosed in Letters Patent No. 737,867, granted to us September 1, 1903, although it will be understood that this construction of rack-bar is adapted to a great variety of other purposes.

Referring to the drawings, in which we have shown one form of embodying our aforesaid invention, Figure 1 is a plan view of a portion of a flat strip of metal as it appears after the first stamping operation. Fig. 2 is a plan view of the same strip of metal as it appears after the second operation of bending over the flanges. Fig. 3 is a side elevation of the blank shown in Fig. 2. Fig. 4 is a central sectional view of the complete rack-bar. Fig. 5 is a plan view of the same. Fig. 6 is an end view of the blank shown in Fig. 2. Fig. 7 is a plan view of the blank from which the end brackets of the rack are formed. Fig. 8 is a plan view of the blank from which the hollow stop fitted in one end bracket is formed. Fig. 9 is a plan view of the blank out of which the antifriction-roller is formed. Fig. 10 is an end view of the antifriction-roller complete.

In the practice of our invention we pass a straight strip of metal A of proper thickness and width through a punch or press fitted with dies to stamp out transverse apertures or interstices at fixed distances apart, as indicated at  $a$ . In this case the ends of these apertures are somewhat larger than the middle portion, the

metal being cut away so as to leave a projecting point  $a'$  for a purpose to be hereinafter explained. On the next operation the side portions containing the enlarged parts of the apertures are bent down at right angles to the plane of the central portion of the strip A so as to form lateral flanges  $b$ , the lines of the bending being indicated by parallel broken lines on Fig. 1. The blank then is in the form of an angle-bar having two lateral flanges and its central portion divided into short sections  $a^2$ , separated from each other by the transverse interstices  $a$ . These transverse strips of metal  $a^2$ , which form the central portion of the bar, are the blanks out of which the rack-teeth are formed. By passing the bar in this form through suitably-formed dies the transverse edge portions of the sections  $a^2$  will be bent down into the form of an arch, as indicated in Fig. 4, in such a manner as to form hollow ribs or teeth of proper shape to engage teeth of the gear.

When in use in a window-sash, the rack-bar may be fastened in place without the use of screws or nails by upsetting a number of the projecting points  $a'$ , so as to cause them to penetrate into the wood of the sash in which they are seated, the metal points of course being bent toward the outside by means of a nail-punch or other suitable device.

In order to prevent the gear from traveling off the end of the rack-bar so as to lose engagement therewith, we provide the rack-bar at one end with a suitable stop. In this case the stop is also made of sheet metal. It comprises a retaining-bracket  $c$ , formed of the blank shown in Fig. 7, the projecting wings  $c'$   $c^2$  being bent up at right angles to the main body of the blank to form a three-sided hollow box, into which is fitted the hollow metal stop-block, which is in reality a box open on one side formed of a single piece of metal  $d$ , having four symmetrical projecting wings  $d'$ , bent at right angles to the plane of the central portion. The bracket  $c$  is also formed with two projecting lugs  $c^3$ , which are properly positioned to engage one of the hollow teeth  $a^2$  of the rack-bar, so as to prevent longitudinal dis-



placement. At the other end of the rack-bar is located a similar bracket *c*, which carries an antifriction-roller *e*. This antifriction-roller is formed out of a single piece of sheet metal turned up from a flat blank having the shape indicated in Fig. 9, said blank including a central portion *e'*, which is bent into cylindrical form, and the two symmetrical lugs *e''*, which are perforated to form bearings and which are bent at right angles to the plane of the blank *e'* to close the open ends of the cylindrical portion *e'*, as shown in Fig. 10, the roller being supported in a bracket *c* by means of suitable studs or journal-plugs carried by or forming part of the bracket.

Without attempting to set forth all the changes in form, construction, and arrangement that may be made in the practice of our invention or all the uses to which it may be applied, what we claim is—

1. A rack-bar comprising a strip of sheet metal formed with a series of transverse interstices, the metal between the interstices being bent to form a series of transverse rack-teeth, substantially as described.

2. A rack-bar comprising a strip of sheet metal having its side edges bent to form longitudinal flanges and having its middle portion bent so as to form a series of hollow transverse ribs to constitute the teeth of the rack-bar, substantially as described.

3. A sheet-metal rack-bar characterized by lateral flanges formed integral with a series of transverse hollow ribs, substantially as described.

4. A sheet-metal rack-bar comprising a series of hollow teeth formed integral with

the lateral flanges, said flanges being provided with points or projections along their edges adapted to form a fastening means for holding the rack-bar in place, substantially as described.

5. A hollow rack-bar provided at one end with a removable bracket, an antifriction-roller mounted to turn in said bracket, said bracket being provided with projections for engaging a tooth of the rack-bar, substantially as described.

6. A hollow rack-bar provided at one end with a supporting-bracket having projections for engaging one of the teeth of the rack-bar and a hollow block carried by said bracket in position to form a stop to limit the travel of the rack, substantially as described.

7. The combination of a hollow sheet-metal rack-bar, a hollow sheet-metal box, and means for securing the box at one end of the rack-bar to form a stop to limit the movement of the rack-bar when engaged by a pinion, substantially as described.

8. The herein-described rack-bar comprising a sheet-metal rack provided at one end with an antifriction-roller and at its other end with a block arranged to form a stop to limit the movement of the rack when engaged by a pinion, substantially as described.

In witness whereof we have hereunto set our hands this 12th day of October, 1903.

HENRY E. RATHBUN.  
WM. H. LONERGAN.

In presence of—

JAMES C. MARBLE,  
THOMAS P. BASSETT.