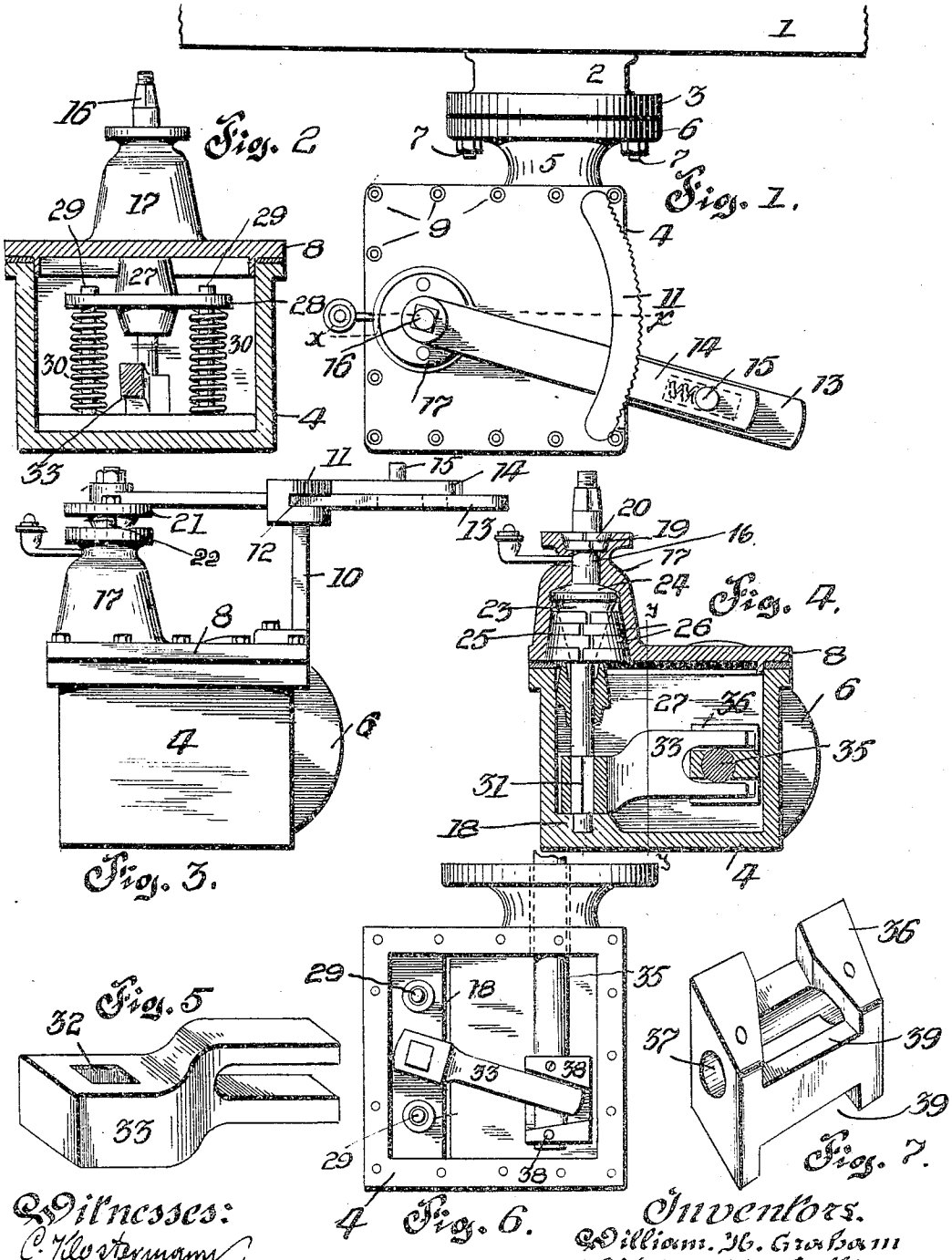
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THROTTLE VALVE PACKING.

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# UNITED STATES PATENT OFFICE.

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## THROTTLE-VALVE PACKING.

SPECIFICATION forming part of Letters Patent No. 792,411, dated June 13, 1905.

Application filed March 18, 1905. Serial No. 250,752.

*To all whom it may concern:*

Be it known that we, WILLIAM H. GRAHAM and WILLIAM H. SULLIVAN, citizens of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Throttle-Valve Packings, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to throttle-valve packings, and has for its object the provision of a packing of this character which will not be subject to the many disadvantageous features of packings of the ordinary construction.

Throttle-valve packings of the ordinary construction comprise merely a packing-box and a gland, the packing-box being fixed on the head of the boiler and the gland being attached to the packing-box by studs or bolts. The packing-box is in the ordinary throttle-valve packing filled with packing material, a large number of such materials having been employed, all of which, however, are ineffectual for maintaining the joint around the actuating-stem of the throttle-valve steam-tight, and the reason for this is that the throttle-valve being very frequently actuated and sometimes very quickly the longitudinal movement of the valve-stem through the packing has the effect of wearing the packing and to a certain extent pulverizing the same, so that being subject to the pressure of the steam from within the boiler the packing is blown out, thus permitting steam to escape into the cab to the manifest discomfort of the engineer.

In carrying our invention into effect we propose to utilize the stuffing-box on locomotives as at present constructed, but to dispense with the ordinary gland and to attach to the stuffing-box in place of the gland a steam-tight casing, into which the stem of the throttle-valve is permitted to protrude, and we actuate said stem through the medium of a vertical shaft projecting through the top of the casing and provided at its point of passage through the top of the casing with a packing of novel character, and we employ in connection with this vertical shaft, which is provided with means for rocking it, certain novel mechanism whereby the rocking motion of the vertical shaft will impart reciprocatory movement to the throttle-valve stem.

The novel details of construction which are embodied in our invention will be developed hereinafter; and our invention consists in the novel construction, combination, and arrangement of parts herein described and claimed, and shown in the accompanying drawings.

In the several figures of the drawings like numerals of reference are used to designate corresponding parts.

In the drawings, Figure 1 is a top plan view of our improvement, showing it attached to the throttle-valve-stem packing-box of a locomotive. Fig. 2 is a vertical sectional view on the line *y y* of Fig. 4. Fig. 3 is an end elevation of the complete packing appliance. Fig. 4 is a vertical sectional view on the line *x x* of Fig. 1. Fig. 5 is a detail view in perspective of a crank that is mounted on the vertical actuating-shaft of the device. Fig. 6 is a top plan view of the casing with the lid and the vertical shaft removed. Fig. 7 is a perspective detail view of a block which is mounted on the throttle-valve stem.

A portion of the head of the boiler is shown at 1 in Fig. 1, and upon the boiler-head is mounted the usual packing-box 2, having a flange 3, this flange being the part to which the gland ordinarily used is attached by bolts or studs. Our improved packing appliance is contained in a casing 4, which has a neck 5 on one side, said neck terminating in an integral flange 6, that abuts the flange 3 of the packing-box and is united thereto by bolts 7. The casing 4 is provided with a removable top 8, secured in position on the casing by bolts 9, and on the top 8 is mounted a bracket 10, which carries an arc-shaped slotted and toothed bar 11, the slot 12 in said bar serving for the reception of the swinging lever 13, which in our improved device constitutes the means whereby the throttle-valve is actuated. A sliding spring-actuated block 14, which has a toothed end that engages with the teeth on the bar 11, is mounted on the lever 13, and said block is provided with an upwardly-pro-

jecting thumb-piece 15, by means of which it may be moved outwardly to free it from engagement with the arc-shaped bar 11. The lever 13 is mounted on the upper end of a vertical rocking shaft 16, and this rocking shaft has a bearing in the packing-box 17, formed integral with the lid 8 of the casing 4, and has also a bearing in a transversely-disposed enlargement 18, formed integral with the bottom of the casing. The packing-box 17 has a packing-recess 19 in its top, that receives split metallic packing-rings 20 20, that are held in position in said packing-recess by a gland 21, said gland being attached to the packing-box by bolts 22. The recess 19 tapers inwardly slightly, as shown, and the packing-rings 20 are correspondingly tapered, so that the downward movement of the gland 21 will tend to cause the packing-rings 20 to tightly embrace the vertical shaft 16. The shaft 16 is formed with an integral enlargement 23, which is cone-shaped and is formed with a slightly-rounded top surface 24, which seats on a reversely-formed surface at the upper end of a packing-recess 25. The packing-recess 25 contains a plurality of split metallic packing-rings 26, these rings having oppositely-tapered inner and outer walls and being of varying size, as shown, the inner walls of the packing-rings corresponding to the angle of the surface of the tapering enlargement 23 and the outer surface or edges of the packing-rings corresponding to the angle of the walls of the packing-recess 25. The rings 26 are held in position in the packing-recess 25 and caused to bear against the tapering enlargement 23 and the walls of the packing-recess 25 by a spring-pressed gland 27. This gland 27 is formed with laterally-projecting ears 28, which are pierced for the reception of stationary vertical guide-rods 29 29, which are fixed in the enlargement 18 on the bottom of the casing, and spiral springs 30 30 surround the rods 29 29 and serve to press the gland 27 against the packing-rings 26.

The shaft 16 is squared at 31, and the squared portion fits in a square hole 32 in a crank 33. The outer end of the crank 33 is bifurcated, and this end embraces the throttle-valve stem 35, the valve-stem passing through the neck 5 and the packing-box 2 and extending into the valve-casing within the boiler. (Not shown.) The valve-stem fits loosely in the neck 5 and in the packing-box 2, the latter where our device is employed being devoid of packing of any description.

A block 36 is mounted on the throttle-valve stem 35, being pierced at 37 for the passage of said valve-stem and the block being held in position by set-screws 38 38, which pass through the upper part of the block and screw into threaded holes in the valve-stem. This block 36 has a substantially V-shaped recess on its upper and lower sides, these recesses being numbered 39 39, the two legs of the bifurcated ends of the crank 33 extending into these recesses and the side walls of the recesses serving as a bearing for the sides of the lever.

The device, being constructed in the above-described manner, operates as follows: When the parts are assembled in the position shown in the drawings, the casing 3 is steam-tight, care being taken to make all the stationary jointings of the device steam-tight and a steam-tight joint being produced around the vertical shaft 16 by the packing-rings 20, the seating of the rounded upper end of the enlargement 23 on the surface 24, and the packing-rings 26. The lower packing-rings are held firmly in position by the spring-pressed gland 27 and, furthermore, by the pressure of the steam within the casing, the throttle-valve stem, as before stated, fitting loosely in and sliding freely through the neck 5 and the packing-box 2, and therefore affording a space for the passage of steam from the boiler into the casing 4. To operate the throttle-valve, the block 14 is pulled back, so as to disengage its teeth from the teeth of the bar 11, and the lever 13 is then moved in one direction or the other, which movement imparts a rocking movement to the shaft 16, that is converted into a reciprocatory movement of the valve-stem 35 through the medium of the crank 33 and block 36. The packings which surround the vertical shaft 16 will be subjected to but very little wear, as the rocking movement of the shaft 16 is very limited, and the movement of the shaft 16 being wholly rotary in one direction or the other the wear on the packing-rings will be practically inappreciable, being no wise so severe as the wear which is imposed on similar rings when they are employed to pack a reciprocating rod.

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

1. In a device for packing throttle-valve stems, the combination with a packing-box, of a closed casing attached thereto, a valve-stem penetrating into said casing, a block fixed on the valve-stem and cut away on its upper and lower sides, a vertical shaft, a crank carried by said vertical shaft and having a bifurcated end embracing the valve-stem and entering the cut-away portions of said block, a packing-box formed on the top of said receptacle and having an interior and exterior packing-recess, packing-rings arranged in the exterior packing-recess, packing-rings arranged in the interior packing-recess, both said sets of packing-rings having inclined external and internal surfaces, a cone-shaped enlargement carried by said vertical shaft, said cone-shaped enlargement having a rounded upper surface bearing on a seat at the upper end of the interior packing-recess, a gland bearing against the rings in the interior packing-recess, vertical rods on which said gland is guided, and spiral springs surrounding said

rods and bearing against said gland, a lever carried by said shaft, and a gland bearing on the packing-rings in the exterior packing-recess, substantially as described.

2. In a device for packing throttle-valve stems, the combination with a packing-box mounted on the boiler, a casing attached to said packing-box, a valve-stem extending through the packing-box and into the casing, a block having recesses in its upper and lower sides and attached to the valve-stem, a crank having bifurcated ends embracing said block, a vertical shaft to which said crank is attached, packing-rings surrounding said vertical shaft, a spring-pressed gland bearing against said packing-rings, and a lever attached to said vertical shaft.

3. In a device of the character described, the combination of a closed casing having an opening in its side for the passage of a valve-stem, a valve-stem extending into the casing through said opening, a crank engaging a part attached to the valve-stem, a shaft on which said crank is carried, said shaft extending exteriorly of the casing and means for imparting rocking motion to said shaft.

4. In a device of the character described, a closed casing, a rock-shaft extending through the wall of said casing, said casing having an interior packing-space surrounding said shaft, packing-rings arranged in said interior packing-space, and a spring-pressed gland bearing against said packing-rings.

5. In a device of the character described, the combination with a casing, of a rock-shaft mounted in the casing and extending exteriorly thereof, said rock-shaft being formed with a tapered enlargement and said casing being formed with an interior packing-recess surrounding the rock-shaft, packing-rings surrounding said enlargement, and a gland arranged in the casing and bearing against said packing-rings.

6. In a device of the character described, the combination with a casing adapted to be attached to a packing-box, and having an orifice for the passage therethrough of one stem of a valve, of a bearing-block adapted to be attached to a valve-stem, a rocking shaft mounted in the casing, means carried by said rocking shaft for imparting rocking motion thereto, means carried by said rocking shaft for imparting reciprocatory motion to said block, and packing means carried by the casing and surrounding said rocking shaft.

7. In a device of the character described, the combination with a casing having an opening for the reception of a valve-stem, a reciprocatory valve-stem extending through said opening and having one end within the casing and the other end outside of the same, said stem being adapted to be connected to a valve outside of the casing of a rocking shaft extending from within the casing to without the same, and means for imparting reciprocating motion from said rocking shaft to the valve-stem.

8. In a device of the character described, the combination with a closed casing, of a rocking shaft mounted in the casing, means for imparting rocking motion to said shaft, a cone-shaped enlargement carried by said shaft, packing-rings surrounding said cone-shaped enlargement and having inclined inner surfaces, and a gland arranged within the casing and adapted to bear against said packing-rings.

9. In a device of the character described, the combination with a closed casing, of a shaft mounted in the casing and extending exteriorly thereof, said casing being formed with a packing-recess having a seat at one end, and one end of said cone-shaped enlargement bearing against said seat, packing-rings surrounding said cone-shaped enlargement, and means mounted in the casing for forcing said packing and rings along said cone-shaped enlargement.

In testimony whereof we affix our signatures in the presence of two witnesses.

WILLIAM H. GRAHAM.
WILLIAM H. SULLIVAN.

Witnesses:
H. C. EVERT,
J. G. KAISER.