Feb. 3, 1925. 1,525,288

P. GESSI

APPARATUS FOR EXPANDING DEFORMED FIRE BOXES OR FIRE TUBES OF STEAM BOILERS

Filed June 16, 1923

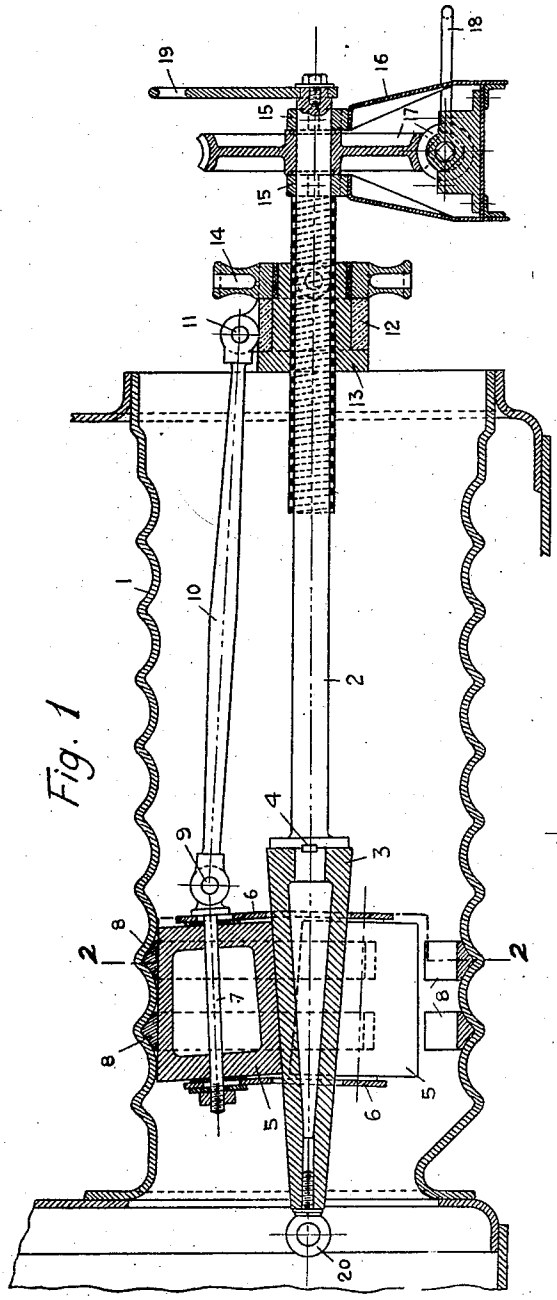


Fig. 1

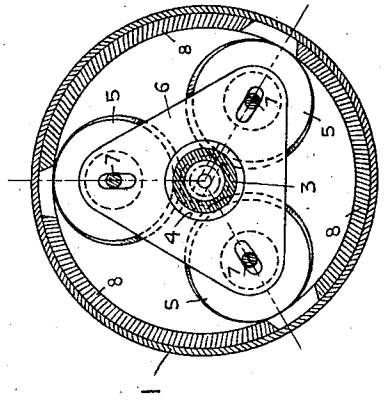


Fig. 2

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Patented Feb. 3, 1925. 1,525,288

UNITED STATES PATENT OFFICE.

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APPARATUS FOR EXPANDING DEFORMED FIRE BOXES OR FIRE TUBES OF STEAM BOILERS.

Application filed June 16, 1923. Serial No. 645,905.

To all whom it may concern:

Be it known that I, PIETRO GESSI, a subject of the King of Italy, residing at Genoa, Italy, have invented certain new and useful Improvements in Apparatus for Expanding Deformed Fire Boxes or Fire Tubes of Steam Boilers, of which the following is a specification.

The invention relates to an apparatus for expanding deformed fire boxes or fire tubes of steam boilers.

According to the present invention there is provided around a cone integral with a main shaft, and arranged on the axis of the fire box or the fire tube to be expanded, a number of equidistant conical rolls connected to guide plates fastened upon the end faces of the rolls so that these conical rolls are held in a circular series but are radially movable upon the guide plates. The said rolls are surrounded with metallic segments corresponding with the shape of the fire box and the rolls are connected by coupling rods with a sleeve freely mounted on a nut arranged upon a threaded portion of the main shaft, so that in rotating the main shaft, on account of the friction exerted by the walls of the fire box and the cone upon the conical rolls, the same will rotate upon the cone and also rotate the coupling rods and the sleeve around the main shaft.

In displacing the nut upon the threaded portion of the main shaft the rolls can be displaced along the cone and gradually change the diameter of its circular travel from a minimum to a maximum expansion.

The invention will now be described with reference to the accompanying drawings, in which—

Figure 1 shows a vertical central section through a corrugated fire box of a steam boiler fitted with apparatus according to the present invention, and

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

In these figures 1 is the corrugated fire box of a steam boiler, within which is axially arranged a main shaft 2 fastened by a key 4 to a cone 3. Around the cone 3 are arranged at equal spaces three conical rolls 5 which are mutually held in position by the triangular plates 6 mounted in relation to the end faces of the rolls by means of the tie-rods 7 which pass through the rolls and the plates, so that the rolls are fastened upon these plates in a circular direction but are movable in the radial direction for the amount of difference existing between the largest and the smallest radius of the cone 3. Upon the rolls 5 are arranged segments 8 which during the working of the apparatus are pressed against the walls to be expanded. The tie-rod 7 of each roll is coupled at 9 by a fork-shaped element with a coupling rod 10 connecting with another fork-shaped element at 11 with the sleeve 12, freely supported upon the nut 13. 14 is a hub with radially projecting spokes within which a rod can be introduced and the hub rotated around the main shaft and thus effect the displacement of the nut on the threaded portion of the shaft 2. The shaft 2 is supported by the bearings 15 arranged on the frame 16. 17 is a worm and a worm wheel which by means of the handle 18 can be put in rotation, thus rotating the shaft 2. The shaft 2 is provided at its ends with eye-bearing elements 19 and 20 which allow the suspension of the apparatus from a hoist.

In order to put the apparatus in working condition the position of the cone 3 is arranged to correspond with that part of the fire box or fire tube to be expanded, care being taken that the expanding segments or at least one of them is in close contact with the wall to be expanded. Then the shaft 2 will be rotated. The friction exerted between the roll and the cone causes the rolls to rotate upon the cone and with the rolls also to rotate the connecting rods 10 and the sleeve 12 on the nut 13, the latter maintaining its axial position on the threaded portion of the shaft until a displacement is caused by the rotation of the hub 14.

When the rolls have reached on the cone the position of its maximum diameter and its circular travel has reached its maximum amount, the expanding device is taken off from this position and mounted in another position of the fire box to be expanded and the before described operation is repeated.

It is to be observed that the guide plates form a substantial cage in which the rolls are held from independent axial movement within the tube but are allowed independent radial movement owing to the provision of

the slots with which the tie rods are engaged.

It is believed in view of the foregoing that a further detail description of the operation of the invention is entirely unnecessary. Likewise it is believed that the advantages of the invention will be readily apparent.

Having thus fully described the invention what is claimed as new and desired to be secured by Letters-Patent is:

1. Apparatus for expanding deformed fire boxes and fire tubes of steam boilers comprising a main rotatable shaft arranged on the axis of the fire box or fire tube to be expanded, a cone carried by and projecting longitudinally from the inner end of the shaft, a plurality of conical rolls arranged about the cone, guide plates arranged adjacent the end faces of the rolls and forming a cage in which the rolls are rotatably mounted so that they may have independent radial movement, metallic segments surrounding the rolls and corresponding with the shape of the wall to be expanded, a member adjustably mounted on the shaft, a sleeve loose on said member and means for coupling each of the rolls to the sleeve substantially as and for the purposes set forth.

2. Apparatus for expanding deformed fire-boxes and fire tubes comprising a main rotatable shaft disposed on the axis of the fire box to be expanded, a cone carried by and projecting longitudinally from the inner end of the shaft, a plurality of conical rolls arranged in a circular series about the cone and equidistant with respect to each other, guide plates arranged adjacent the respective end faces of the rolls, tie rods traversing the guide plates and the rolls and being connected with the plates and forming supports for the rolls, the plates and rods forming a cage for the rolls in which the rolls are permitted independent radial movement, a nut adjustably mounted on the shaft, a sleeve loosely mounted on the nut and coupling rods interposed between the sleeve and the tie rods, and means for rotating the nut upon the shaft substantially as and for the purposes set forth.

In testimony whereof I have signed my name to this specification.

PIETRO GESSI.