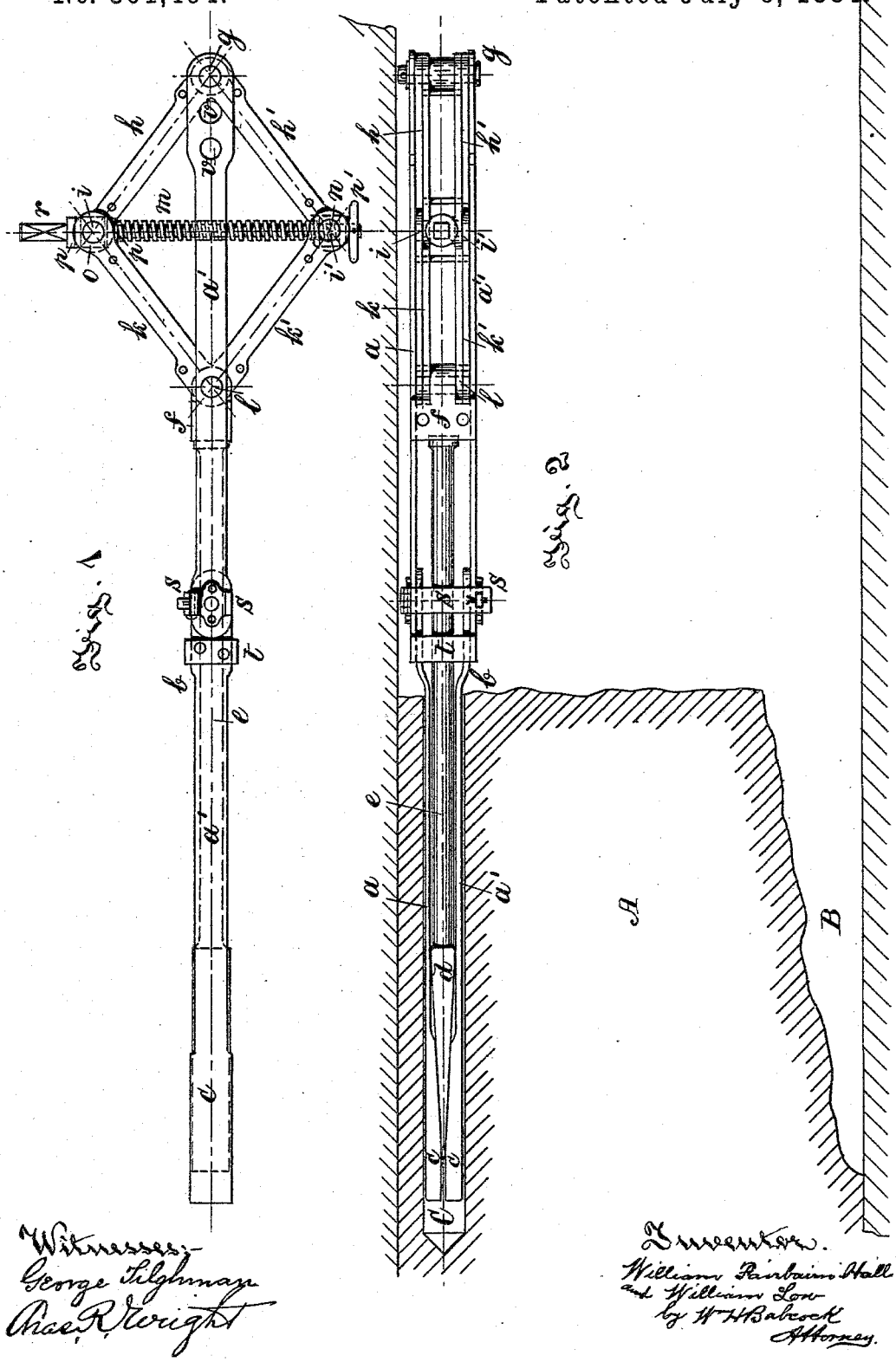
(No Model.) 2 Sheets—Sheet 1.

W. F. HALL & W. LOW.

APPARATUS FOR BREAKING DOWN COAL.

No. 301,494. Patented July 8, 1884.



Witnesses:
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Inventors.
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(No Model.) 2 Sheets—Sheet 2.

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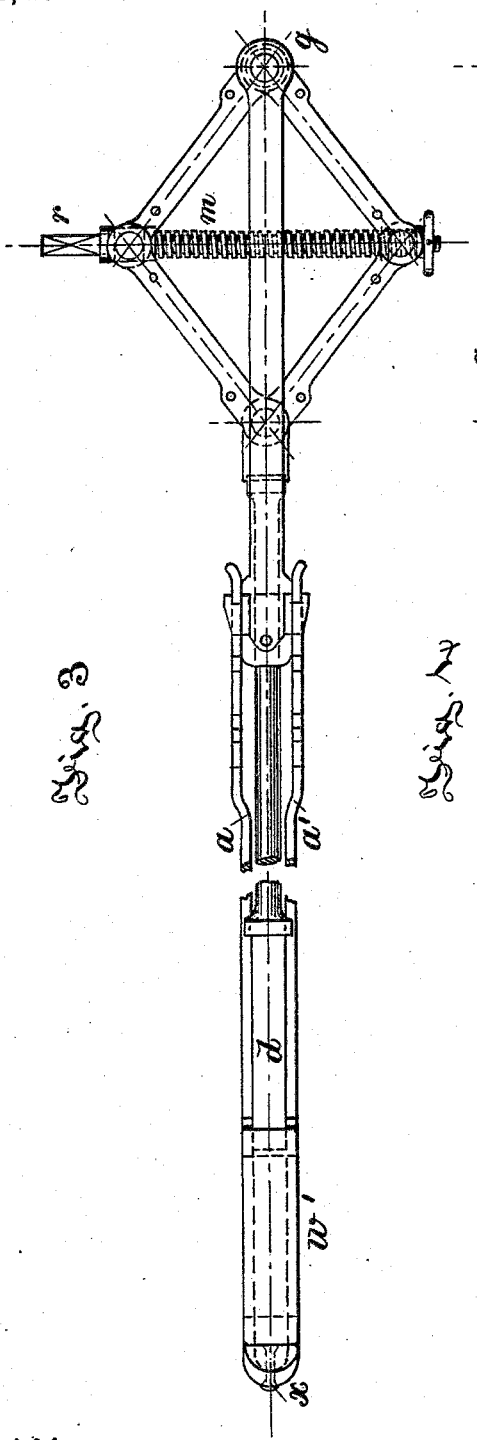

Fig. 3.

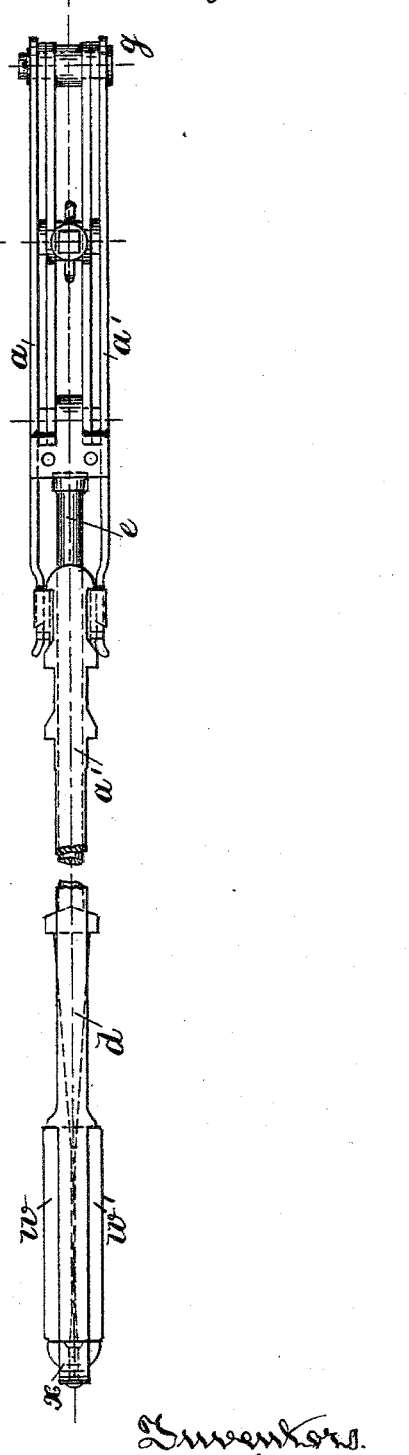

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM FAIRBAIRN HALL AND WILLIAM LOW, OF DURHAM, COUNTY OF DURHAM, ENGLAND.

APPARATUS FOR BREAKING DOWN COAL.

SPECIFICATION forming part of Letters Patent No. 301,494, dated July 8, 1884.

Application filed October 10, 1883. (No model.) Patented in England July 6, 1883, No. 3,370.

To all whom it may concern:

Be it known that we, WILLIAM FAIRBAIRN HALL and WILLIAM LOW, subjects of the Queen of Great Britain, both residing at Durham, in the county of Durham, England, have invented certain new and useful Improved Apparatus for Breaking Down Coal or other Minerals, (patented in Great Britain July 6, 1883, No. 3,370;) and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Our invention relates to apparatus used for breaking down coal in collieries by splitting large masses of such coal with the aid of one or more holes first bored in suitable positions into it.

It has heretofore ordinarily been usual to blast the coal by means of gunpowder or other explosive introduced into the holes—a process of frequent danger, and by which the coal is much broken and injured; or, sometimes apparatus has been introduced into the holes and expanded by the pressure of water forced into it, so as to break down the coal.

Our present invention has for its object improvements in apparatus for so forcing down the coal by mechanical means only, substantially as described and without hydraulic pressure.

In the accompanying drawings, which are in illustration of our invention, Figure 1 is a plan of the apparatus, and Fig 2 a side view showing it in position for work. Fig. 3 shows a plan of a modified form of arrangement, and Fig. 4 a side view of the same.

The same letters of reference indicate similar parts in the several figures.

A represents the mass of coal which is to be broken down, shown undercut below at B in the usual way, C being a hole of suitable size, bored by hand or in other convenient way, in the upper part of the coal, and the novel apparatus being introduced into this hole, as shown.

a a' are two parallel bars of iron or steel, of such size and at such distance apart that they can just enter the hole C freely. These bars are preferably opened out at a point, *b*, outside the hole C, so as to leave greater space between them, and at or near their inner ends at *c* they are thickened and brought close together, their opposing faces being flattened and slightly inclined, so that when a strong wedge at *d* is thrust between them they are forcibly separated. The wedge *d* is formed upon or attached to the end of a strong central bar, *e*, which projects backward for a sufficient distance from the hole C. The bars *a a'* are also carried back for a sufficient distance, and serve as parallel guides for a movable cross-head, *f*, attached to or operating against the central bar, *e*. At the extreme outer end of the bars *a a'* is arranged a transverse pin, *g*, upon which are pivoted the outer ends of two pairs of links, *h h'*, the other or inner ends of which are jointed at *i i'* to the outer ends of two corresponding pairs of links, *k k'*, the other or inner ends of which are in turn pivoted by a pin, *l*, to the cross-head *f*. A strong screw, *m*, passes through between the links, and works in a nut, *n*, in the pin *i'*, which connects the sets of links upon one side, and in a socket, *o*, in the pin *i*, which connects the sets of links upon the other side, collars and pins *p p'* being arranged to regulate the movements of the screw *m*, which can be turned round by a handle of any convenient kind fixed upon its end at *r*. The bars *a a'* are preferably made in two parts, firmly connected together by bolts and cross-pieces at S, so that they can be conveniently separated for the convenience of carriage, and they are strongly stayed together where necessary, as shown at *t t*.

When the apparatus is to be used, the links *h h' k k'* are separated at their jointed centers *i i'* by turning the screw *m*, and the cross-head *f* is drawn back, so that the bar *e* and wedge *d* can also be drawn back and the parts *c c* brought together, and the apparatus can then be inserted in the hole C, as shown in the figures. The screw *m* being then turned in the other direction, the joints *i i'* are drawn together, and the cross-head *f*, bar *e*, and wedge *d* will be thrust forward and inward

with a force increasing gradually as the jointed centers *i i'* of the links approach each other, and the two inner ends, *c c*, of the bars *a a'* will be separated with very great force, and will break down the mass of coal at A, but gently, and without shattering it. It will be seen, therefore, that we combine the force of the wedge, screw, and lever in order to obtain the desired separating action upon the coal, and in this way we obtain very great force in the direction required by mechanism which is very simple and easily operated. It may be applied in any desired position, and may be used for getting or splitting other minerals or hard substances instead of coal. In such cases three or more bars may be used instead of two, *a a'*, a conical wedge being used at *d*, and the separation being effected in every direction; and apparatus so made may be used for other purposes—such as expanding the ends of tubes.

The position of the outer pin, *g*, may be made variable, two or more holes being made for it in the bars *a a'*, as shown at *v*, and by arranging the fixed pin *g* at *l* and the sliding cross-head *f* at the outer ends of the bars at *g*, the wedge *d* can be reversed, so as to be drawn out instead of being thrust in, and the bar *e*, being then in tension, may be made lighter.

In Figs. 3 and 4 a similar general method of arrangement of the apparatus is shown; but movable blocks *w w'* are shown fitted between the inner ends of the bars *a a'*, which are arranged at right angles to their outer ends, so as to serve as guides for the blocks, the latter being separated by the action of the wedge *d*, the inner ends of the bars *a a'* remaining fixed and being united, as shown at *x*. Where soft material is to be operated upon and less force is required to break it, the screw *m* may be omitted, and the joints *i i* may be brought together by levers.

We are aware that prior to our invention coal-getting machines have been made with movable parts separated by the action of a wedge, and we do not claim such a combination, broadly; but

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

The combination of the bars *a a'*, having their inner ends brought close together, and adapted to enter a hole in a mass of coal or other mineral, in combination with a central bar, *e*, having a wedge, *d*, formed on its inner end, a cross-head, *f*, to which the other end of said rod *e* is attached, the links *h h' k k'*, connected by screw-tapped pins *n n'*, as stated, and the screw *m*, which engages with said pins and causes said links to give longitudinal motion to said central bar, *e*, for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM FAIRBAIRN HALL.
WILLIAM LOW.

Witnesses:
JAMES MATHER,
THOMAS STEEL ALLISON.