(No Model.)

E. & B. HOLMES.

STAVE BENDING MACHINE.

No. 297,401. Patented Apr. 22, 1884.

Fig. 1.

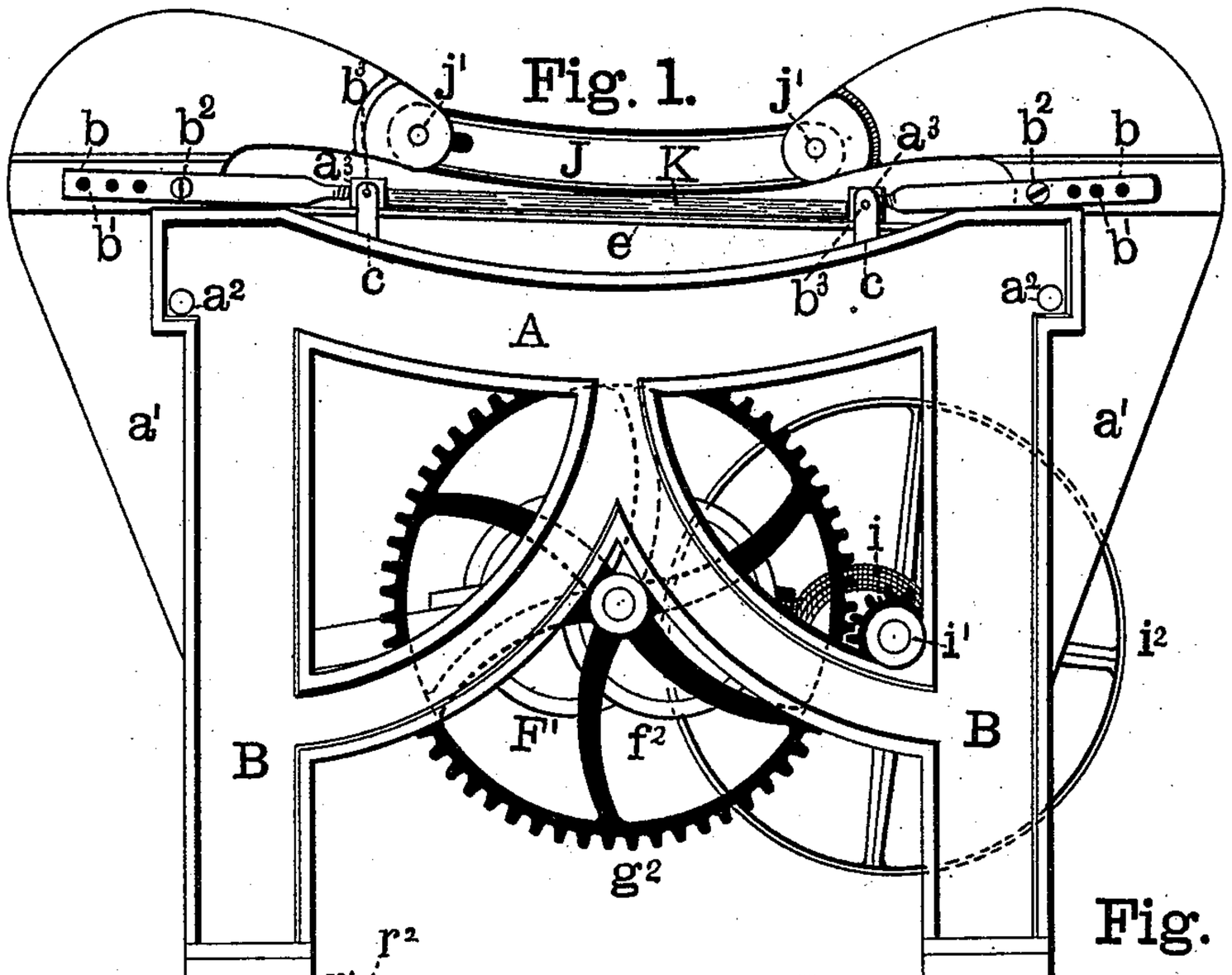


Fig. 3.

Fig. 2.

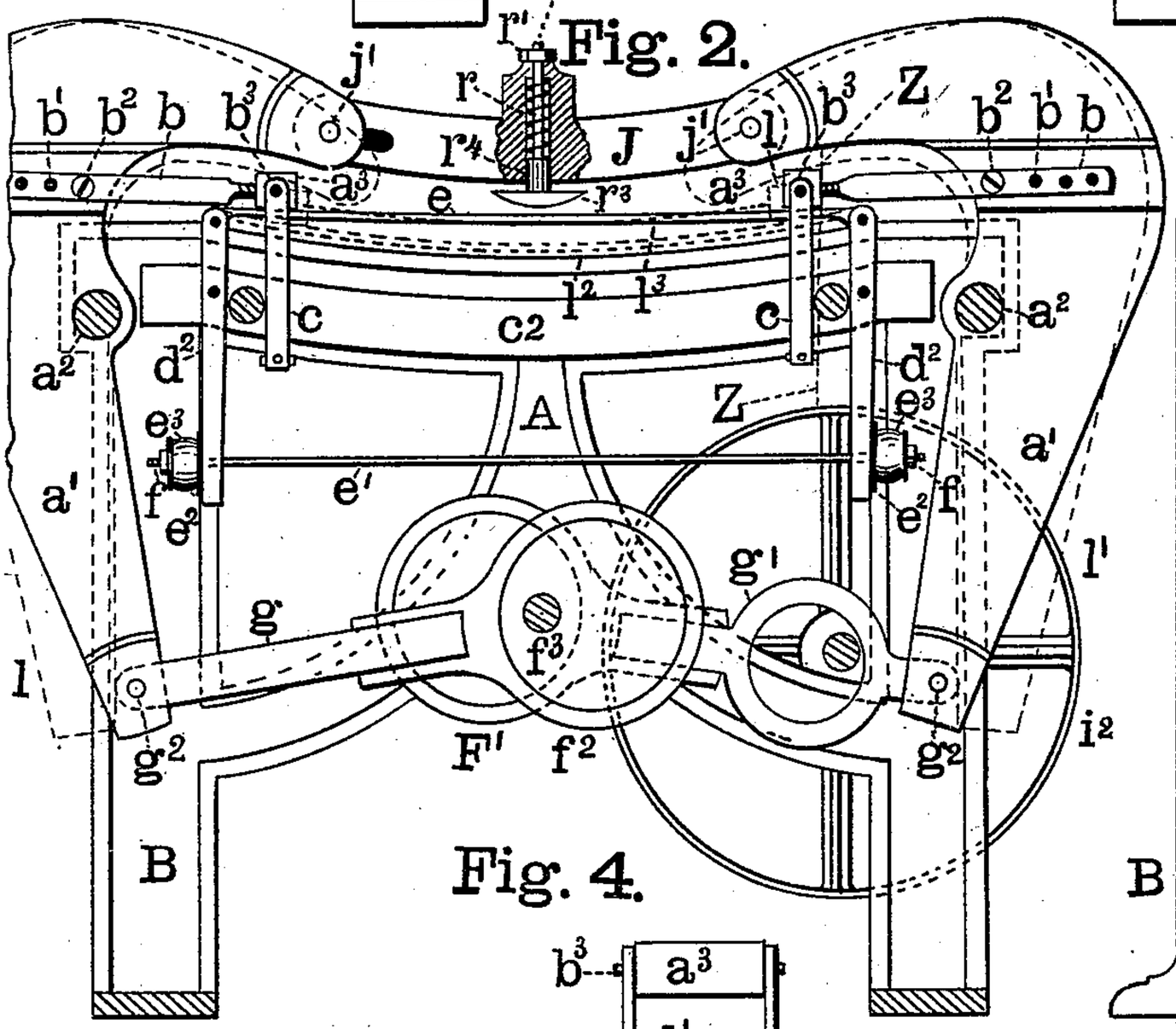
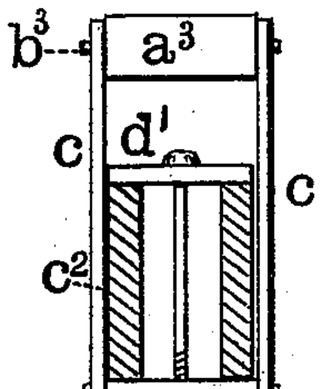


Fig. 4.



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EDWARD HOLMES AND BRITAIN HOLMES, OF BUFFALO, NEW YORK.

STAVE-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 297,401, dated April 22, 1884.

Application filed March 30, 1883. (No model.)

To all whom it may concern:

Be it known that we, EDWARD HOLMES and BRITAIN HOLMES, citizens of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in a Machine for Bending Staves, of which the following is a specification.

In bending staves for beer, ale, or other similar barrels, the great difficulty heretofore has been that a large percentage of the staves break during the operation of bending.

The object of our invention is to obviate this objection by applying the bending-pressure at the ends of the staves and sustaining the back of the same, as will be fully and clearly hereinafter shown by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine complete. Fig. 2 is a vertical longitudinal section through line *x x*, Fig. 3. Fig. 3 is an end view of the machine; and Fig. 4 represents a vertical section through a portion of the machine, in line *z z*, Fig. 2.

A represents the frame of the machine, constructed of cast-iron or other suitable material.

a' represents the endwise-pressing arms, one being arranged at each end of the machine, so as to swing on trunnions a^2. Their upper portions or pressing-jaws are provided with pushing-blocks, a^3, which are secured to the pressing-arms *a'* by bars *b*, having a series of perforations, *b'*, so that they can be adjusted forward or back to suit staves of different lengths. They screw into the pushing-blocks, as shown, and are secured to the pressing jaws or arms *a'* (one on each side of each of the arms *a'*) by a bolt, b^2, which acts as a pivot upon which they can swing or turn slightly. On each side of the pushing-blocks a^3 is a journal or pivot, b^3, on which are pivoted the arms or bars *c*, having their lower ends pivoted to a cross-bar, *c'*, (see Fig. 4,) which passes across the under part of the stationary or fixed bed c^2. The bed c^2 is made in two parts, and secured by bolts and trunnions c^3 to each side of the frame of the machine. The cross-bar *c'* is capable of being adjusted backward or forward as the bars *b c* are adjusted, and fastened at any point desired on the bed c^2 by means of a bolt, *d*, and a cross-bar, *d'*. (See Fig. 4.)

Near each end of the bed c^2 are two arms, d^2, pivoted to each side of the bed by bolts d^3. To the upper ends of the arms d^2 is secured the spring or yielding bed *e*. This bed *e* is made of spring-steel or any other suitable material. It is made sufficiently thick and strong to prevent the staves from breaking and forcing it out of shape or out of the required bend or curve, and may have an upper layer or covering of leather or other suitable material, if desired. The lower ends of the arms d^2 are secured by a rod, *e'*, which runs between them and through a cross-plate, e^2, and then through a rubber or other equivalent spring, e^3. (See Fig. 2.) The tension of the spring or yielding bed *e* is adjusted by means of the springs e^3 and screw-nuts *f*. (See Fig. 2.)

F' f^2 represent two eccentrics, made in the usual way, and rigidly secured to the driving-shaft f^3. They are connected to the lower ends of the arms *a'* by the arms *g g'* and the bolts g^2.

To the shaft f^3 is fastened a spur-wheel, g^3, which gears into a pinion, *i*, on the shaft *i'* of the driving-pulley i^2. J represents a transverse pressing-bar, secured by bolts *j'* to the upper ends of the arms *a'*. The hole through one end of the bar J is enlarged or lengthened, so as to allow for the forward movements of the arms *a'*. This bar J may in some cases be dispensed with, if desired; but for some purposes or some kinds of staves it may be used with advantage. For some kinds of work the pushing-blocks may be cast in one piece with or be rigidly fastened to the arms *a'*, in which case the arms or bars *b c* could be dispensed with; but we prefer the arrangement above described. There are many other equivalent ways for giving the movements to the arms *a'* besides the eccentrics described and shown—for instance, a toggle-joint connected by an arm to a crank on the driving-shaft, or it may be operated by a steam-cylinder connected thereto in any well-known way; besides, there are many ways known to the mechanic for giving such movements. We therefore do not wish to be confined strictly to the devices shown and described for giving the reciprocating movements to the said arms.

The operation of the machine is as follows: A stave, K, being put into the machine, as

shown in Fig. 1, the movement of the eccentrics, when at or near the limit of their outer movements, brings the endwise-pressing arms a' and pushing-blocks a^3 into the position shown by the dotted lines $l\ l'$ in Fig. 2, and thereby bends or brings the stave and the yielding bed below it into the position shown by the dotted lines $l^2\ l^3$ in Fig. 2. As the machine continues its movements the stave is released, so it can be removed and another put in its place.

In Fig. 2 I have shown in the transverse pressing-bar J a device for giving a heavy spring-pressure to the stave while bending it, the object being to give an elastic or yielding pressure at that point, and also to allow for the different thicknesses of the staves to be bent. (See the portion broken away in the said Fig. 2.)

r^3 represents the pressing-iron; r^2, an upright bar, having an enlargement, r^4, near the bottom, upon which the spring r presses. This rod passes up through a hole at the top, and is kept in place by a nut, r', which also regulates the distance at which the pressing-iron shall move downward. The spring r presses against the bottom r^4 and against the top of the frame, as shown. For some kinds of staves this arrangement would be necessary. The spring r should be very strong, so that the pressure-foot r^3 would require a hard pressure to move it. This part of our invention will be clearly understood by reference to the foregoing description and Fig. 2 of the accompanying drawings.

It will be readily seen from this construction that the stave is bent solely by the pressure against the ends of the same, and that as it bends it is forced against a strong, yielding spring-bed. The stave, being thus bent, is compressed in the direction of its length, so that while the inner side is compressed in length the outer side of the bend is not increased in length; consequently there is no danger of separating the fibers or breaking the stave.

We claim—

1. The within-described mode of bending staves, consisting in applying the pressure at the ends of the stave in the direction of its length and partly downward in the direction of the bend while the back or outside of the stave is supported on a yielding bed, substantially as described.

2. In a machine for bending staves, the arms or levers for giving the end-pressure, and their operating mechanisms, substantially as described, and the pushing-blocks a^3, secured by pivots to the arms b, and made adjustable by bolts b^2, in combination with the arms c, having their lower ends pivoted to a cross-bar, substantially as and for the purposes specified.

3. The end-pressing arms provided with pushing-blocks, and their operating mechanism, substantially as described, and a yielding bed secured to the pivoted arms d^2, in combination with the rod e' and springs e^3, for the purposes specified.

4. The end-pressing arms or levers, the adjustable pushing-blocks secured to the pivoted arms b, as specified, a yielding spring-bed secured to the pivoted arms d^2, and the rod e' and springs e^3, in combination with the eccentric $F'\ f^2$, arms $g\ g'$, and their operating mechanism, substantially as described.

5. The combination of the spring or yielding bed, the arms d^2, pivoted to the bed c^2, rod e', springs e^3, and screw-nuts f, for the purpose of regulating the tension of the yielding spring-bed, substantially as described.

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