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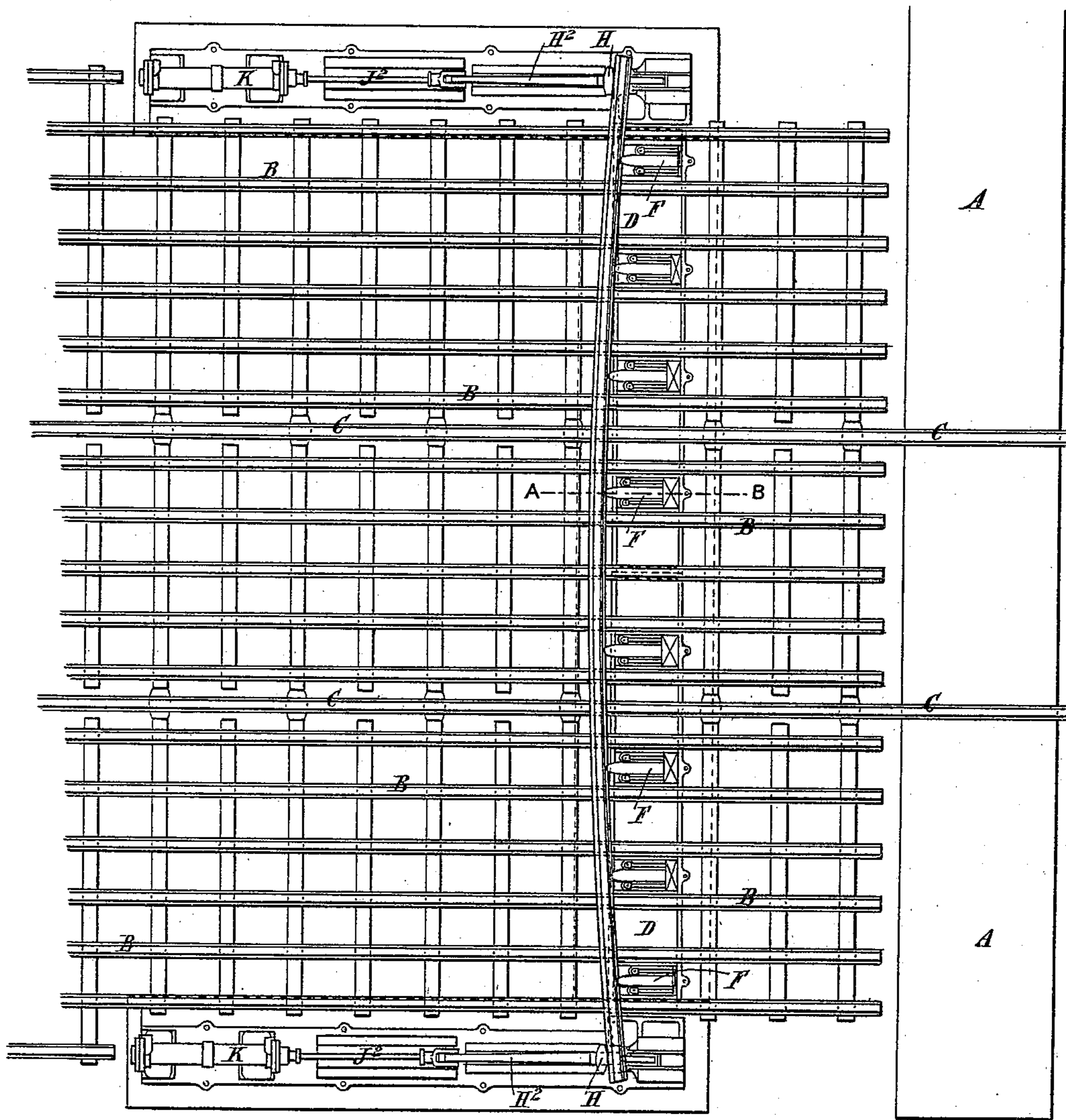
4 Sheets—Sheet 1.

J. DUFFIELD.
APPARATUS FOR CAMBERING RAILS.

No. 447,051.

Patented Feb. 24, 1891.

Fig. 1.



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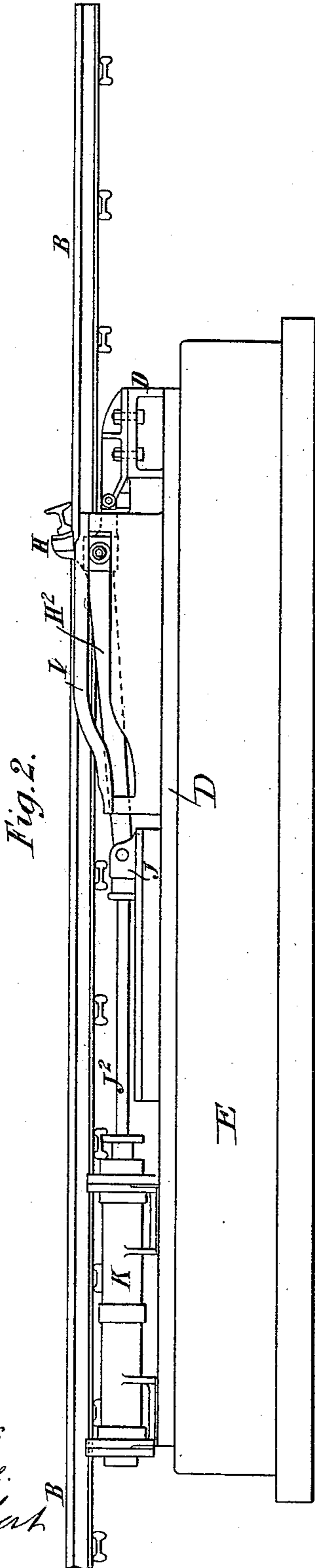
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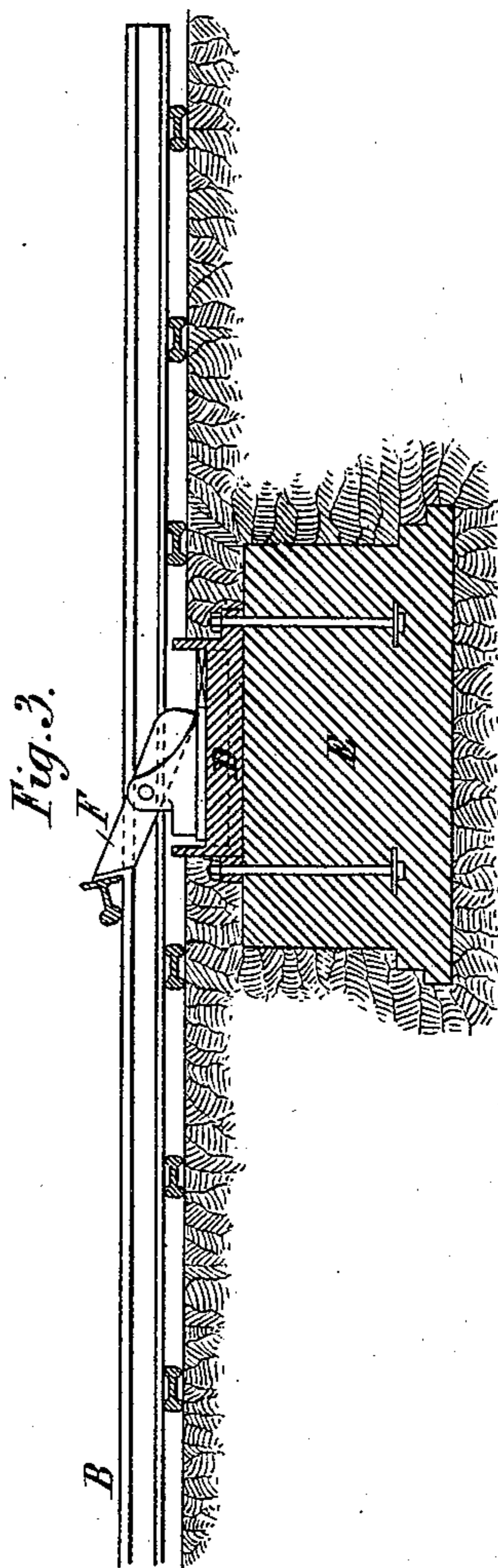
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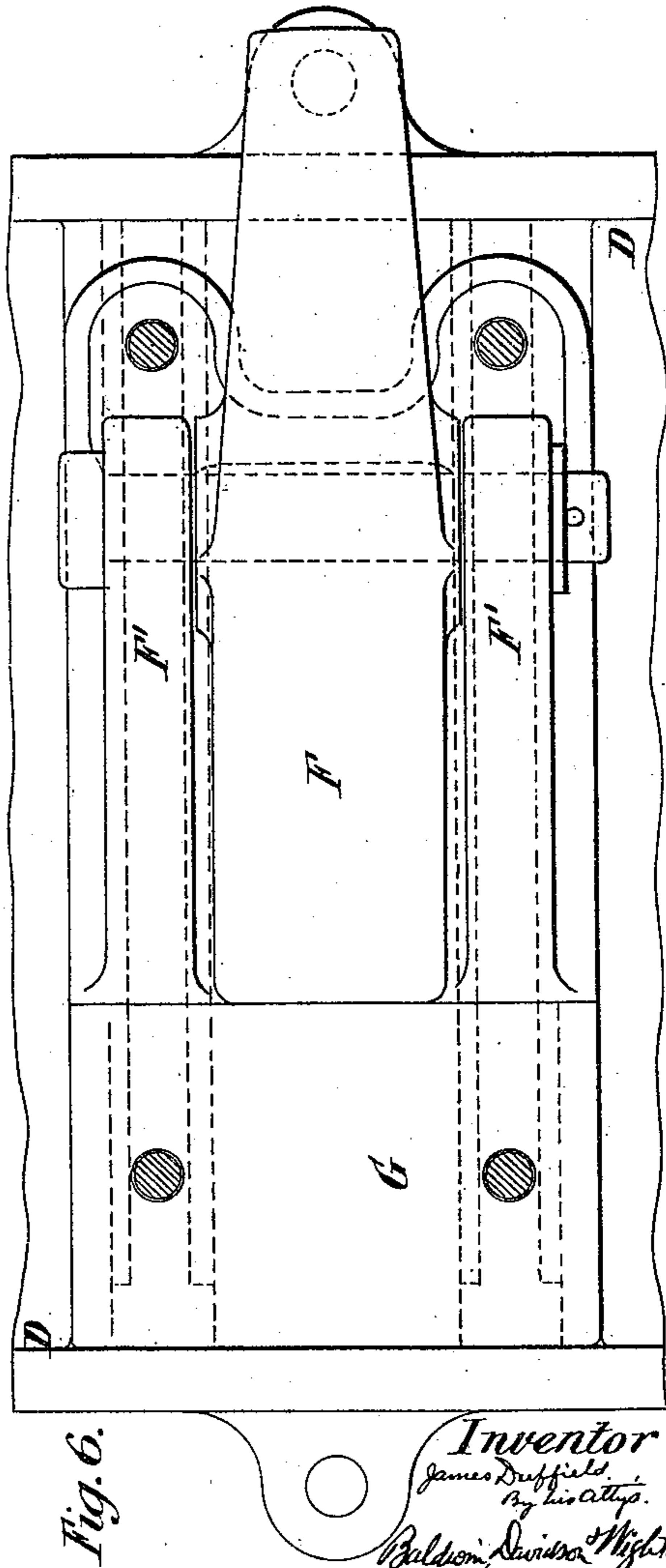
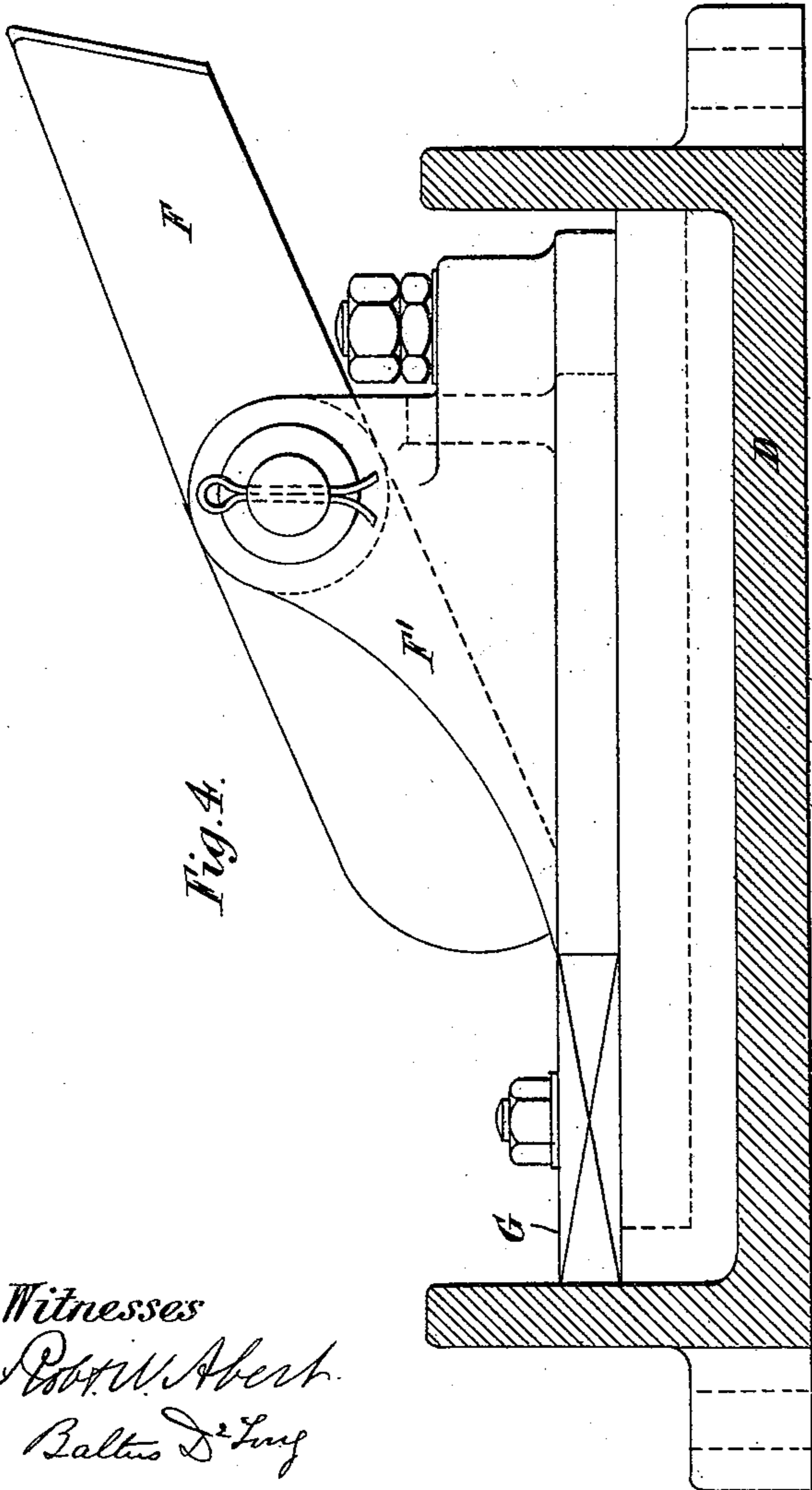
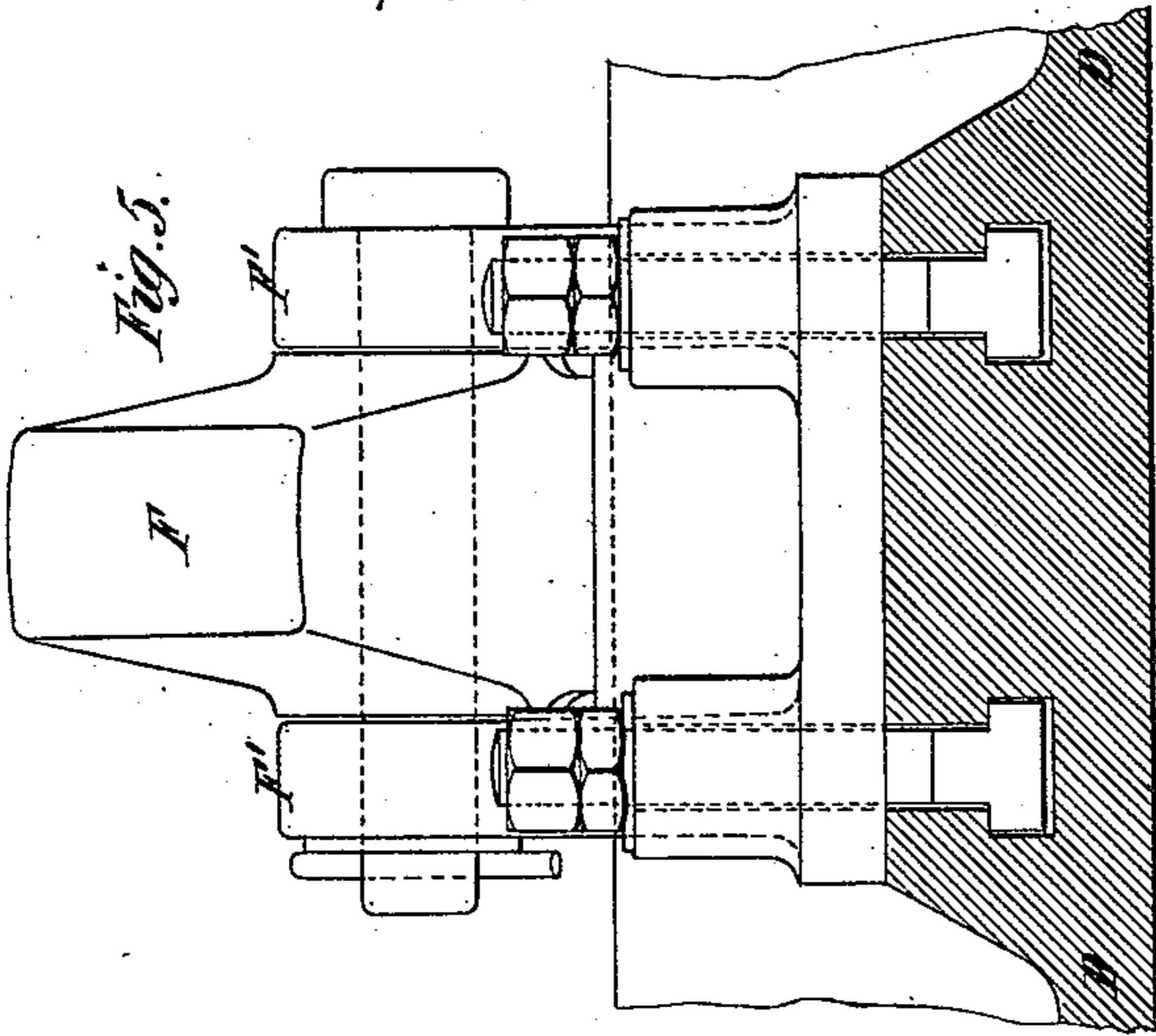
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4 Sheets—Sheet 4.

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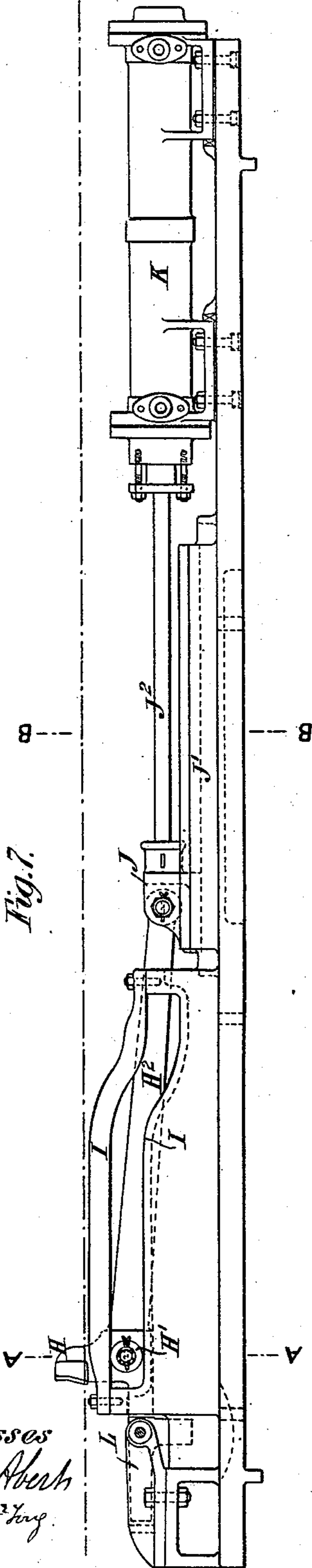


Fig. 7.

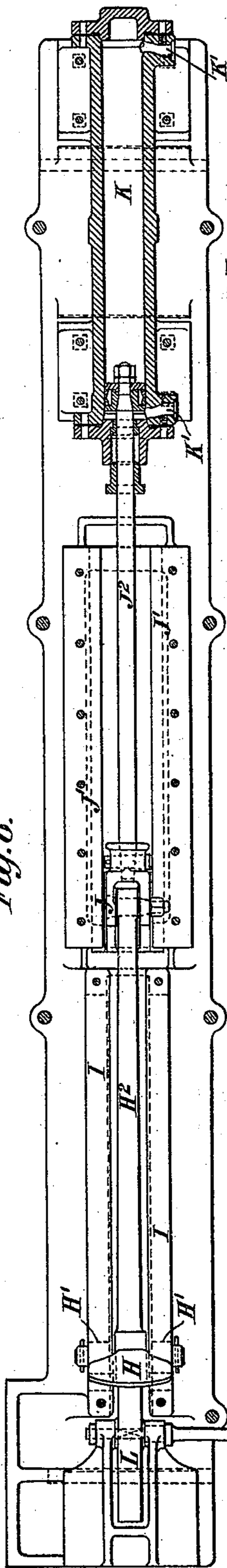


Fig. 8.

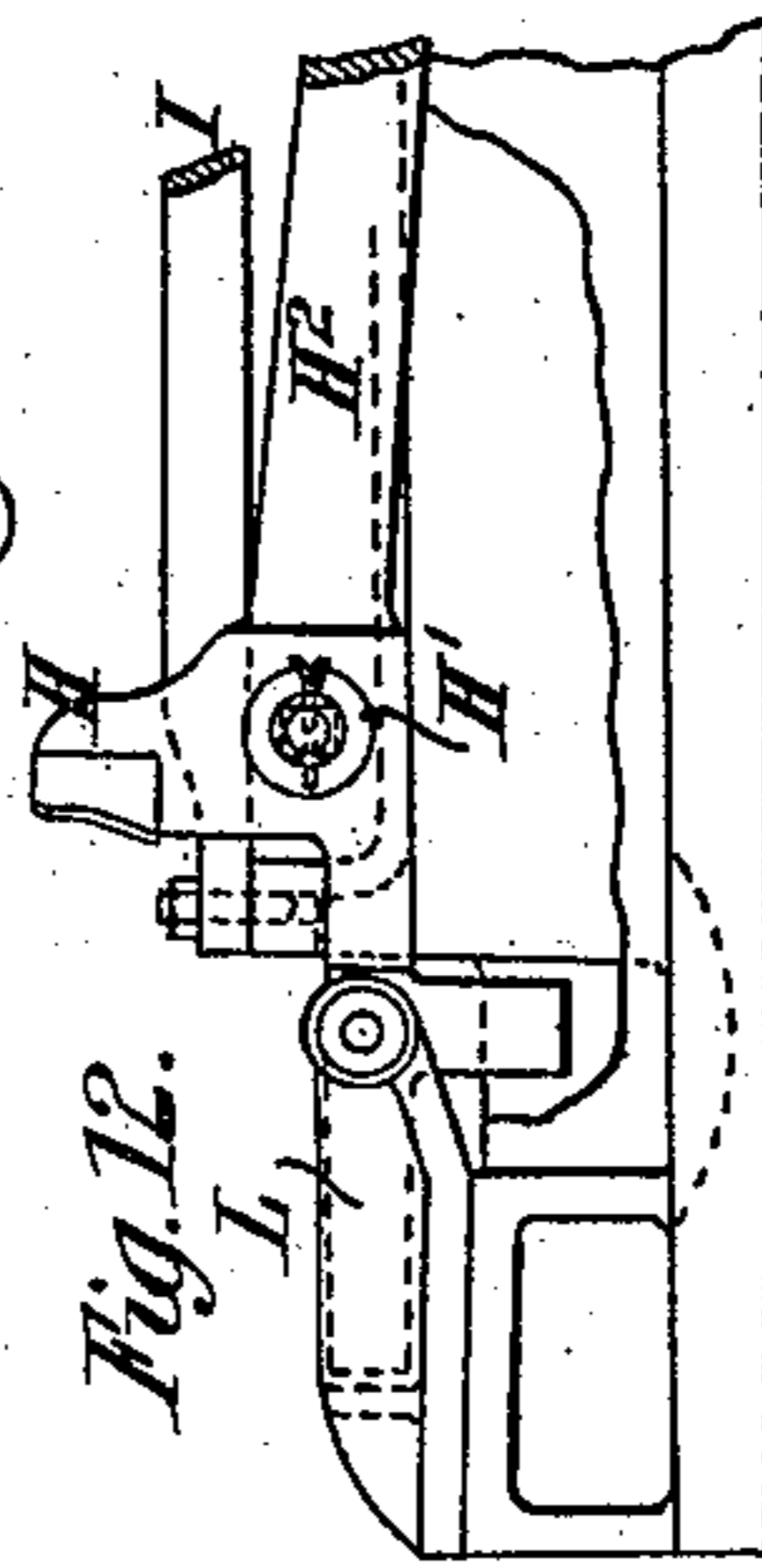


Fig. 12.

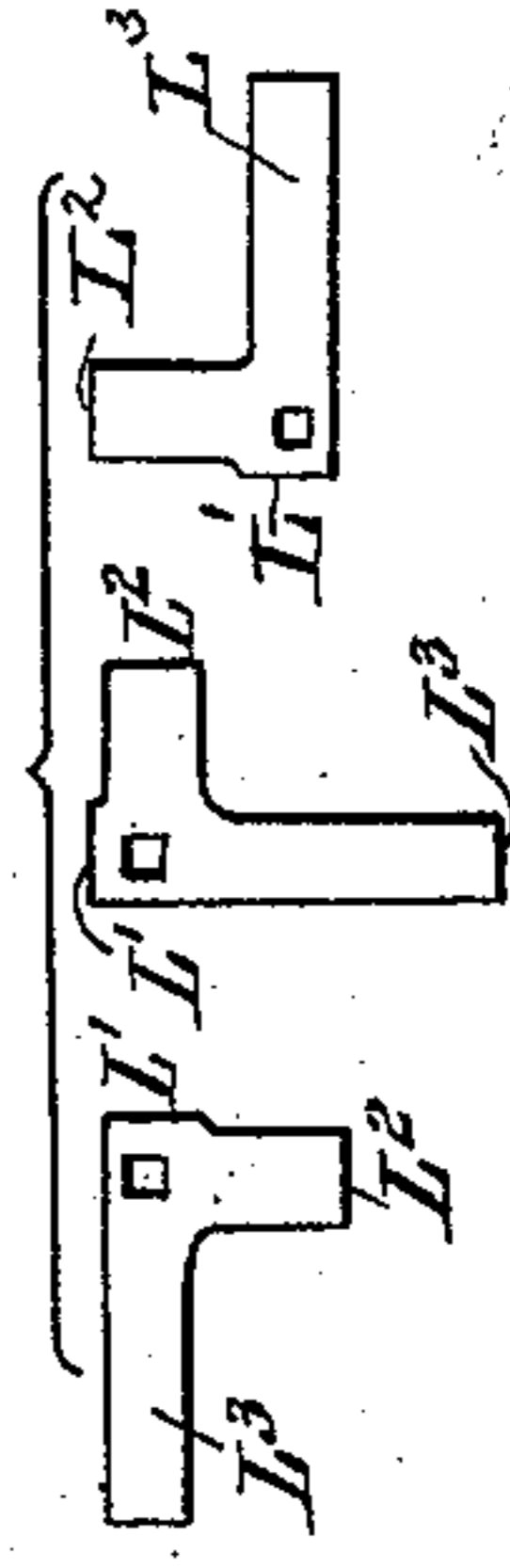


Fig. 13.

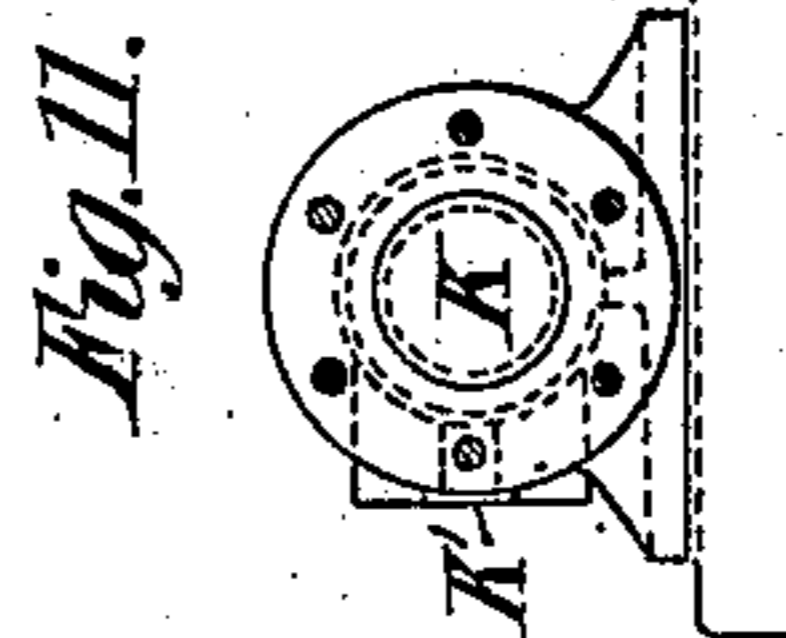


Fig. 11.

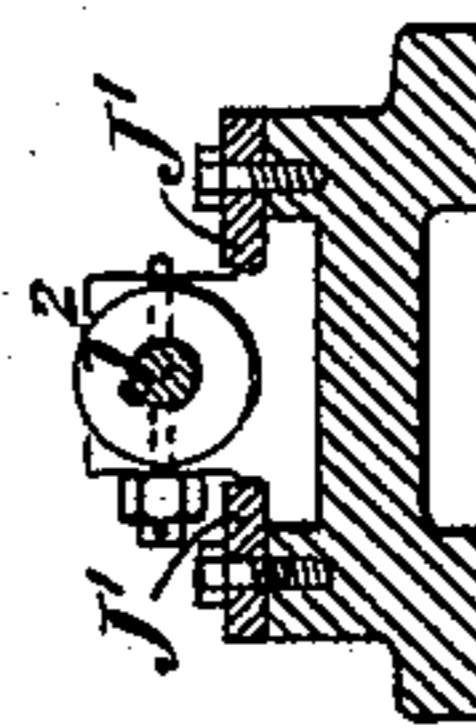


Fig. 10.

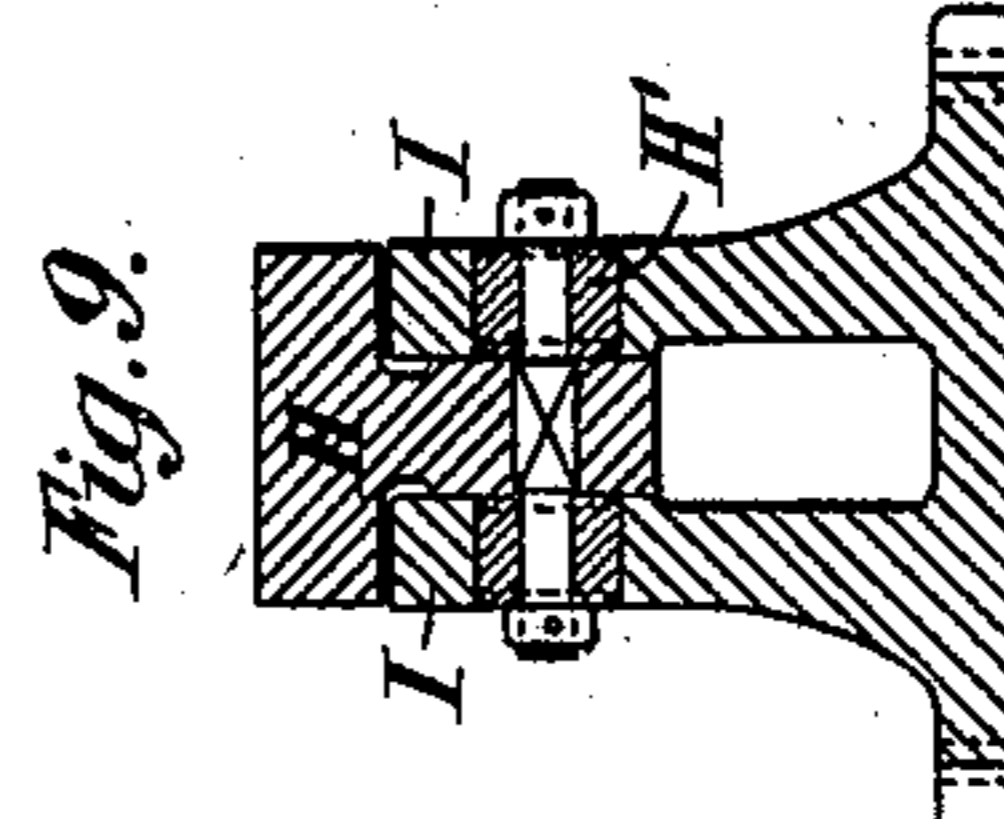


Fig. 9.

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UNITED STATES PATENT OFFICE.

JAMES DUFFIELD, OF ASHFIELD, ENGLAND.

APPARATUS FOR CAMBERING RAILS.

SPECIFICATION forming part of Letters Patent No. 447,051, dated February 24, 1891.

Application filed August 15, 1890. Serial No. 362,052. (No model.)

To all whom it may concern:

Be it known that I, JAMES DUFFIELD, steel-works manager, a subject of the Queen of Great Britain, residing at Ashfield, Workington, in the county of Cumberland, England, have invented certain new and useful Improvements in Rail-Cambering Apparatus, of which the following is a specification.

The most approved form of rail-cambering apparatus existing prior to my invention seems to have been one in which a bar or rail, after being rolled into suitable shape and sawed into suitable lengths, was traversed endwise transversely over a series of rollers with their upper surfaces lying in the same horizontal plane between a series of stops and a series of heads, between which the requisite camber or curve was imparted to the rail. After being thus curved the rail is in some cases delivered upon a hot-bed by a continuation of this endwise movement, and in others moved laterally over stops sunk beneath the hot-bed at the proper moment by mechanical means. Both of these plans necessarily require complicated mechanism.

The objects of my invention are to simplify the construction of the apparatus, to increase its efficiency, and to facilitate the traverse of the rail over the hot-bed. These ends I attain by certain novel constructions, combinations, and organizations of instrumentalities hereinafter specified, in which the hot rail is drawn transversely over the hot-bed, and in doing so rides over a series of counterpoised automatic yielding stops, which rise behind it and act as abutments, against which it is held while being cambered by the action of rams, over which the rail subsequently passes as it is discharged from the bed.

The accompanying drawings represent so much of an apparatus embodying my improvements as is necessary to illustrate the subject-matter claimed. Unless otherwise indicated, whether shown or not, the parts are of well-known construction and operation.

Figure 1 is a plan; Fig. 2, a side elevation, and Fig. 3 a vertical longitudinal section on the line A B, Fig. 1. Fig. 4 shows a side elevation of one of the automatic counterpoised tilting stops, with its bed-plate in section; Fig. 5, a similar end view, and Fig. 6 a plan

thereof. Fig. 7 is a side elevation, and Fig. 8 a plan, of one of the rams and its actuating mechanism. Fig. 9 is a vertical transverse section on the line A A of Fig. 7, and Fig. 10 a corresponding section on the line B B thereof. Fig. 11 is an end elevation of one of the hydraulic cylinders. Fig. 12 is a side elevation, partly in section, of the rear end of the bed-plate, showing the ram and its controlling-stop. Fig. 13 shows this stop in three different positions, according to which, one, two, or three rails may simultaneously be cambered.

That end of the apparatus upon which the rail is first delivered I term the "front," the opposite the "rear," end. The rails, after being sawed to a proper length, are deposited while still hot upon a plate A, constituting the front of the hot-bed B, provided with a track C, upon which the mechanism for traversing the rails along the hot-bed travels, which mechanism is not shown in the drawings. A bed-plate D, strongly secured upon a solid foundation E beneath the hot-bed, supports a series of stops F, arranged across it at suitable intervals, as well as the bed-plates which support the front ends of the rams on each side of the hot-bed.

In Fig. 3 the tilting stops are shown as composed of bars or levers F, rocking vertically on central pivots below the upper surface of the hot-bed, inclining backward and upward with their rear ends protruding above the bed, and as counterpoised by making their forward ends heavier or by using a spring. As a consequence of this organization the heated bar, when drawn laterally along the hot-bed, rides over these tilting stops, which yield automatically, but rise again immediately after the bar has passed and resume their normal position, where they are ready to act as abutments against the rail, when pressed against them by the heads H of the rams acting on each end of the rails. The stops may be separately adjusted horizontally, backward, or forward, in accordance with the curve desired to be given to the rail, by inserting packing-pieces G of different widths between the front end of the bed-plate D and of the stop-supporting frame F', both these frames and the packing-pieces

being secured to the bed-plate by suitable bolts. Stud-shafts on each side of the ram-heads, carrying friction-rollers H' , traversing guide-slots I , so shaped as to cause the ram-heads in their advanced positions to protrude above the upper surface of the hot-bed where they bear against the ends of the bar, but when retracted to descend below the bed in order that the bar may pass laterally over them as it is discharged. A pin-jointed pitman H^2 connects each ram-head with its respective cross-head J , traversing in guides J' . A piston-rod J^2 connects each cross-head with the piston of a hydraulic cylinder K , to either end of which water can be admitted through passages K' . The extent of the forward movement of the rams is controlled by a stop M , Fig. 13, in the shape of an elbow-lever having three arms L^1 , L^2 , and L^3 mounted on a shaft controlled by a suitable handle to facilitate its adjustment. This stop enables one or more rails simultaneously to be cambered. For instance, the arm L^1 , when in the position shown in dotted lines in Fig. 7 and on the left of Fig. 13, gives the proper adjustment for cambering a single rail, the arm L^2 in a similar position gives the proper adjustment for cambering two rails, and the arm L^3 three rails.

The operation of the apparatus will readily be understood from the foregoing description, from which it will appear that my machine possesses several distinguishing peculiarities, viz: The bar is traversed laterally over a fixed bed. It rides over stops, which automatically yield to allow it to pass and rise again immediately to form abutments, against which the bar is forced backward by ram-heads rising from beneath the bed to bend the bar, and again descending to allow the bar to pass over them as it is discharged from the bed, and finally several bars can simultaneously be cambered.

What I claim as of my own invention is—

1. The combination, in a rail-cambering machine, substantially as hereinbefore set forth, of a hot-bed, stops so constructed and arranged as automatically to rise behind the rail after it has passed laterally over them to act as abutments therefor, rams which thrust the rail against the stops to bend it, and means for actuating the ram.

2. The combination, in a rail-cambering machine, substantially as hereinbefore set forth, of a hot-bed, counterpoised stops pivoted below its upper surface and so constructed and arranged as normally to project above it to be automatically depressed below said surface by the passage of the rail laterally thereover and to rise again behind the rail to act as abutments therefor, rams which thrust the

rail against the stops to bend it, and means for actuating the rams.

3. The combination, in a rail-cambering machine, substantially as hereinbefore set forth, of a hot-bed, stops so constructed and arranged as automatically to rise behind the rail after it has passed laterally thereover, to act as abutments therefor, rams so constructed and arranged as to thrust the rail against the stops to bend it and then to sink below the bed to permit the bent rail to pass over them, and means for actuating the rams.

4. The combination, in a rail-cambering machine, substantially as hereinbefore set forth, of a hot-bed, counterpoised stops thereon so constructed and arranged as normally to project above it, to be automatically depressed by the passage of the rail over them, and to rise again behind the rail to act as abutments therefor, rams which thrust the rail against the stops to bend it, guides inclined relatively to the hot-bed and engaging the rams, so as alternately to lift the rams above it to press the rail and to lower them below it to allow the rail to traverse the bed, and means for actuating the rams.

5. The rail-cambering machine hereinbefore described, consisting of the combination, substantially as hereinbefore set forth, of a hot-bed of parallel longitudinal rails, a transverse series of counterpoised automatically-yielding stops so constructed and arranged as normally to project above the hot-bed, to be automatically depressed by the passage of the rail laterally over them, and to rise again behind the rail to act as abutments therefor, rams so constructed and arranged as to thrust the rail against the stops to bend it, guides inclined relatively to the hot-bed, so as alternately to lift the rams above it to act upon the rail and to lower them below it to allow the rail to traverse the bed, and means for actuating the rams.

6. The combination, substantially as hereinbefore set forth, of a hot-bed, stops so constructed and arranged as automatically to rise behind the rail after it has passed laterally over them to act as abutments therefor, rams which thrust the rails against the stops, means for actuating the rams, and an adjusting-arm which regulates the extent of the forward movement of the rams, thereby adapting them to act simultaneously upon several rails.

JAMES DUFFIELD.

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