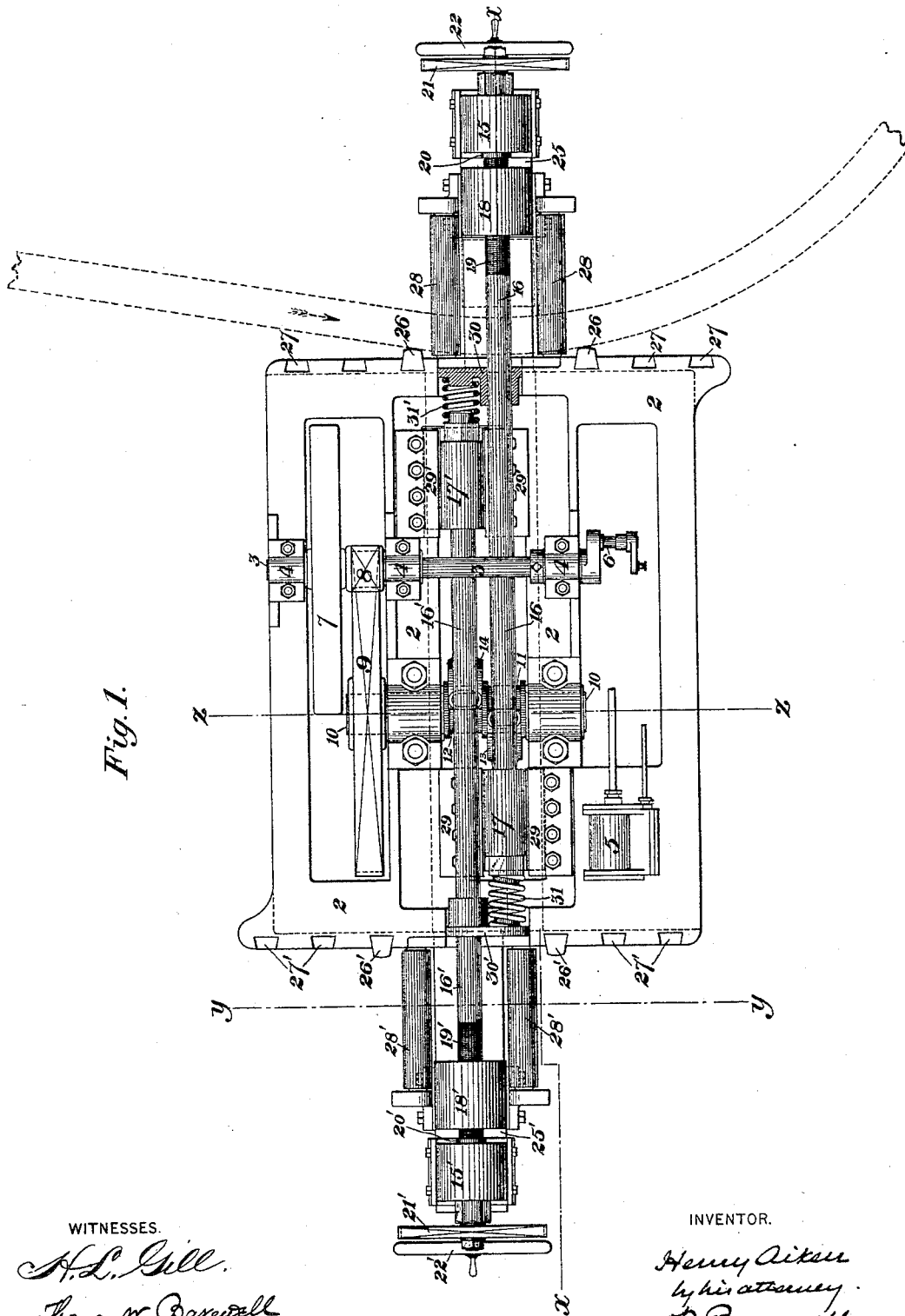


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No. 453,605.

Patented June 9, 1891.



WITNESSES.

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*Thomas W. Baxwell*

INVENTOR.

*Henry Aiken*

*by his attorney.*

*T. Baxwell*

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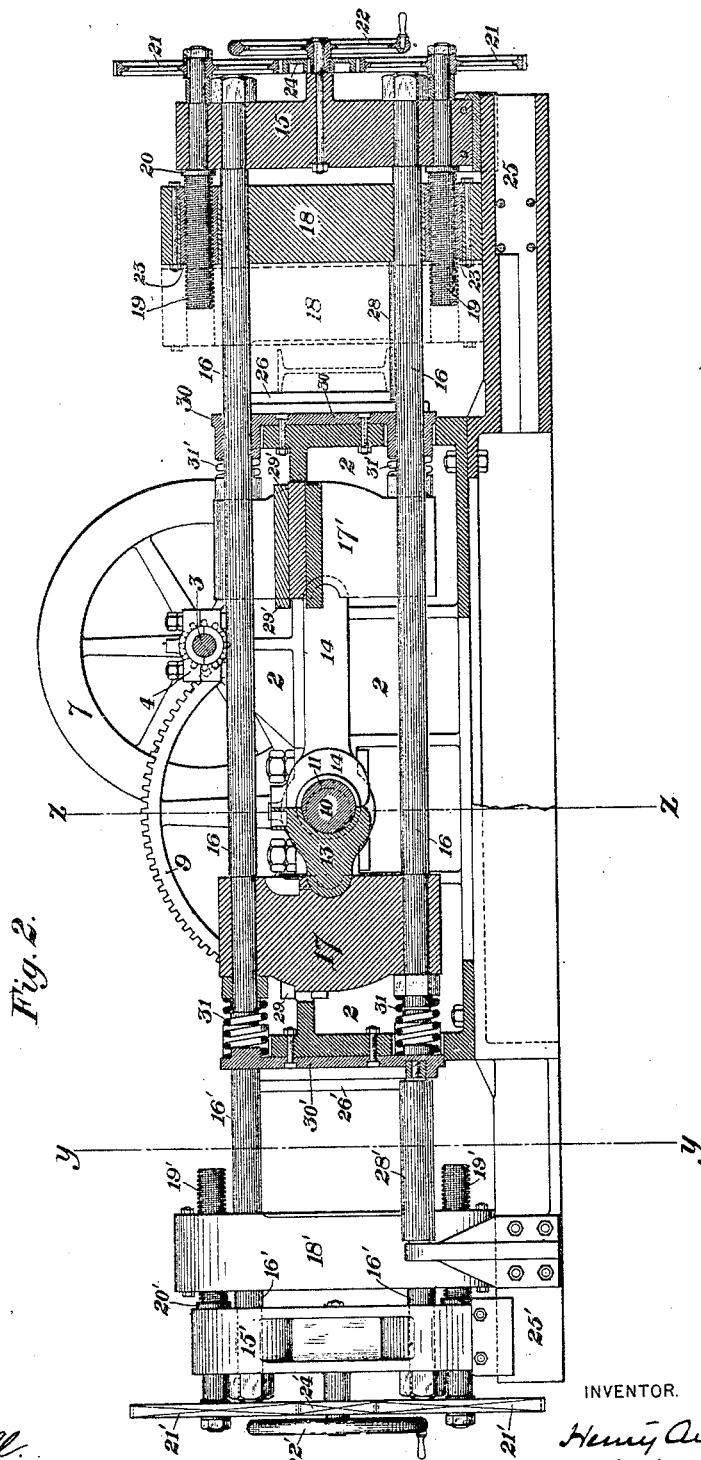


Fig. 2.

WITNESSES.

*N. L. Gill.*  
*Thomas W. Baskwell*

INVENTOR.

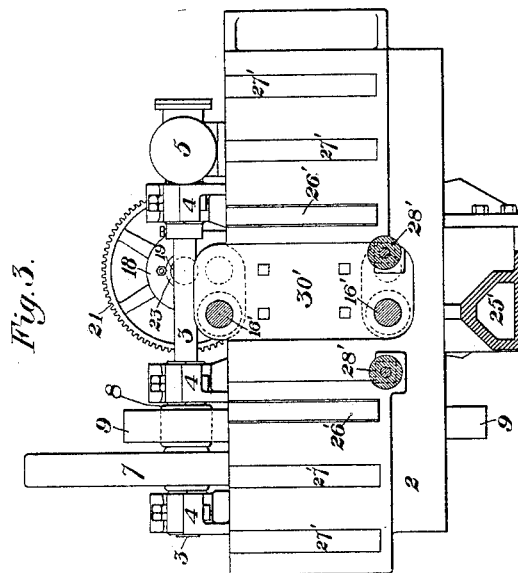
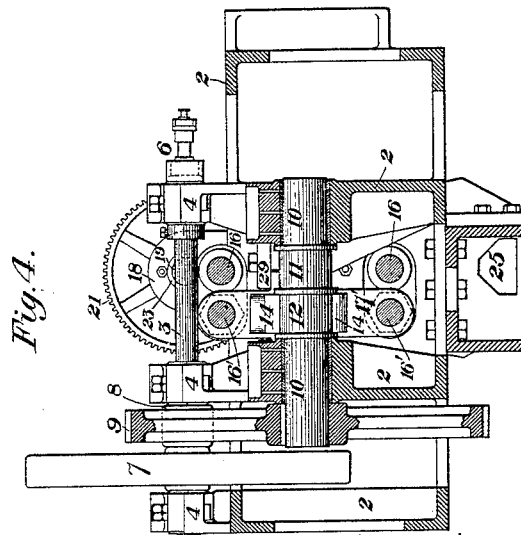
*Henry Aiken*  
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*N. Baxendell*

# UNITED STATES PATENT OFFICE.

HENRY AIKEN, OF HOMESTEAD, PENNSYLVANIA.

## MACHINE FOR BENDING OR STRAIGHTENING METAL BEAMS.

SPECIFICATION forming part of Letters Patent No. 453,605, dated June 9, 1891.

Application filed December 24, 1888. Serial No. 294,498. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY AIKEN, of Homestead, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Straightening or Bending Metal Beams, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a plan view of my improved machine. Fig. 2 is a vertical longitudinal section on the line *xx* of Fig. 1. Fig. 3 is a vertical cross-section on the line *yy* of Fig. 1. Fig. 4 is a vertical cross-section on the line *zz* of Fig. 1.

Like symbols of reference indicate like parts in each of the figures.

My improved machine is designed for use in straightening or bending metal beams, such as I-beams, angle-iron, or beams or bars of any other shape. Its mode of construction and the advantages resulting from its use are indicated in the following specification.

In the drawings, 2 represents the frame of the machine, which may be made of any suitable form and should be sufficiently strong to withstand the strain to which it is put in use.

3 is the main driving-shaft, which is journaled in suitable bearings 4 and is driven by any suitable power connections, preferably, however, by a steam-engine cylinder 5, which is fixed to the frame 2 and is operatively connected by a piston and connecting-rod (not shown) with a crank 6 on the shaft 3. This shaft is provided with the usual fly-wheel 7, and is connected by gear-wheels 8 and 9 with a shaft 10, on which are the cams which directly actuate the moving parts of the machine. The sizes of the gear-wheels 8 and 9 are preferably so related to each other that the cam-shaft 10 shall rotate at a slower rate of speed than the main shaft 3.

In order that the machine may be double-acting, I provide the shaft 10 with two cams 11 and 12, having cam-yokes 13 and 14, directed, respectively, toward opposite ends of the machine.

The operative parts of the machine are duplicated, so as to afford at both ends means for straightening beams. I shall first describe the construction of the parts for oper-

ating the straightening mechanism (shown at the right hand of Figs. 1 and 2) and shall then indicate the relation of the remaining parts of the machine thereto. 15 is a moving plunger situated at the end of the machine and connected by horizontal rods or bolts 16 with a cross-head 17, which is adapted to be reciprocated horizontally by means of the cam-yoke 13, Fig. 2, and for that purpose is mounted between suitable slideways 29. On the inner side of the plunger 15 is the head 18, which engages the beam for the purpose of straightening it. The rods 16 pass through this head, and the head is adjustably connected with the plunger, so as to move therewith, by screws 19, the threaded portions of which pass through threaded sockets or nuts 23 in the head and the shanks of which have their bearings in the plunger 15 and are provided with collars 20, fitting against the inner side of the plunger. On the outer side of the plunger 15 the screws 19 are provided with cog-wheels 21, which are in gear with a pinion 24, the shaft of which is journaled in the plunger 15 and is provided with a hand-wheel or crank 22, the rotation of which will drive the cog-wheels and the screws, and will thereby separate or bring together the head and plunger, accordingly as the screws are turned in one direction or the other, thus widening or contracting the space in which the beam is placed to be bent or straightened, so as to accommodate the width of this space to the size of the beam to be operated on or to the degree of curvature to be imparted thereto, as is hereinafter explained. The plunger 15 and its connected head 18 are set on suitable slideways 25, on which they are moved by the reciprocations of the rods 16, actuated by the cam 11 and cross-head 17. The beam to be bent or straightened is placed between the head 18 and the end plate 30 of the main portion of the machine-frame 2, which latter is provided with projecting anvils 26, against which the beam has a lateral bearing. These anvils are removably set in sockets 27, and by setting them in sockets situated a proper distance apart the distance between the lateral supports of the beam may be adjusted to suit the degree of the curve or bend to be given thereto. The beam is supported vertically between the anvils and the

head 18 by horizontal rollers 28, which enable the beam to be easily fed to and through the machine.

The operation of the machine is as follows:

5 The end of the beam to be straightened or curved is placed on the rollers 28, between the head 18 and the anvils 26, and by means of the hand-wheel 22 and screws 19 the head 18 is moved away from the plunger 15 up to the  
10 beam, and then by starting the cam-shaft 10 into action the head and plunger are caused to reciprocate, so as to press the head against the beam and to straighten the part pressed upon, or to curve it (as the case may be) in  
15 the usual manner. The beam is fed through the machine lengthwise on the rollers and is subjected to a proper number of compressions until all its parts are straightened or curved. The throw of the cam 11 is small,  
20 and the reciprocations of the plunger and head are therefore short; but the extent of the pressure exerted by the latter on the beam is determined by the operator by means of the screws 19, since by turning the hand-  
25 wheel 22 the head 18 may be set at a greater or less distance from the plunger 15, and the limit of its forward motion thereby regulated. This forms a very convenient mode of adjusting the machine. In the drawings I have  
30 shown by full lines the head 18 retracted nearly to the full extent by the screws 19, and in dotted lines I show it in an advanced position in readiness for action on the beam. In curving beams such as those used for  
35 arched structures the degree of curvature is governed by proper spacing of the anvils 26 and by proper adjustment of the head 18, and as the beam is curved by passing through the machine it bends in the direction of the  
40 moving head and plunger away from the body of the machine, as illustrated by dotted lines in Fig. 1. The fact that the head in the act of bending thus moves toward the machine proper and not away from it, as in prior machines, enables me to effect this result, and is  
45 therefore a feature of marked importance, because otherwise the bending of the metal in toward the machine would cause it to seriously interfere with and impede the operations thereof, and the machine itself would  
50 afford an obstacle to the bending of the beam to the extent which is often desired.

The parts at the other end of the machine are similar in construction and mode of action  
55 to those described, and for convenience in explanation I have numbered them with like reference-figures, distinguished by the prime (') mark. The plunger 15' and its head 18' are driven by rods or bolts 16' from the cross-  
60 head 17', which derives its reciprocating motion from the cam 12 and cam-yoke 14. The cams 11 and 12 actuate or may actuate their driven parts in one direction only, the motion in the reverse direction being effected by  
65 springs 31, interposed between the outer ends of the cross-heads and the inner sides of the end plates 30.

The straightening mechanism at the respective ends of the machine may be used separately for straightening or bending beams, 70 and in this way the capacity of the machine is double that of machines in which but one beam can be straightened at one time. Many features of my invention are, however, not limited to their employment in connection with  
75 double-headed machines, and may be used as well in machines having bending appliances at one end only. Such, for example, are the following: first, the extensible head or plunger provided with screws (or other mechanical  
80 appliances) for extending or retracting it, the advantages of which are the facility of adjustment afforded by the machine and the lessened labor and the less number of workmen required to operate the machine as compared  
85 with the machines heretofore used for the same purpose; second, the moving of the head toward the main frame or driving mechanism of the machine in the act of bending the beam, as distinguished from moving it in a direction  
90 away therefrom toward a projecting wing of the machine-frame, on which are the anvils against which the beam is pressed. The latter construction is very faulty, because it is difficult to construct the anvil-supports  
95 sufficiently strong to resist the great strain to which at times they must be subjected. By placing the anvils on the frame opposite to the sides of the head next the driving parts  
100 of the machine the main frame can easily be constructed of sufficient strength to withstand the strain of use without making it unduly bulky or providing it with inconveniently-  
105 placed stay-rods or braces. Third, the location of the separated anvils, whether the same be stationary as shown by me or movable, against which the beam is bent, on the side of the beam next to the driving mechanism of the machine, so that in curving a beam its curvature shall be outward and away from such  
110 driving parts.

The advantages of my improved machine will be appreciated by those skilled in the art. It is very strong and compact in its structure, and affords means for straightening  
115 beams rapidly and enables the machine to be operated with fewer men to attend to the work than have heretofore been required.

The parts of the machine which I regard to be novel and of my original invention are  
120 briefly stated in the following claims, each of which states an item of invention unlimited by the limitations and elements named in the others.

Having thus described my invention, what  
125 I claim, and desire to secure by Letters Patent, is—

1. In a machine for straightening or bending beams, the combination of the main machine-frame having at its end separated an-  
130 anvils, a moving head or plunger situated on the outer side of said anvils and between the same, and a power-shaft journaled on said main frame and connected with said moving

head or plunger, whereby the latter is drawn toward the said frame against a beam which bears on the anvils and is braced by the main frame, substantially as and for the purposes described.

2. In a machine for straightening or bending beams, a moving plunger having an extensible head, which acts on the beam, screws connecting the plunger and head and moving therewith, and gearing which connects the said screws to cause their simultaneous action, substantially as and for the purposes described.

3. In a machine for straightening or bending beams, the combination, with the actuating mechanism and the main machine-frame, of a moving head or plunger which is driven toward the machine-frame for action upon a beam interposed between the head or plunger, rolls carrying the beam while being acted upon, anvils or supports fixed directly to the frame, and rods which connect the said head

or plunger with the moving mechanism of the machine and draw the head or plunger against the beam in the act of bending or straightening the same, whereby the strain in use of the machine is exerted directly on the machine-frame, substantially as and for the purposes described.

4. In a machine for bending or straightening beams, the combination of two heads or plungers situated at opposite ends of the machine, and driving mechanism connected therewith to operate them in opposite directions, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 15th day of December, A. D. 1888.

HENRY AIKEN.

Witnesses:

W. B. CORWIN,  
JNO. K. SMITH.