(No Model.) 2 Sheets—Sheet 1.

J. A. POTTER.

ART OF AND MACHINE FOR CUTTING FLANGED BEAMS.

No. 485,981. Patented Nov. 8, 1892.

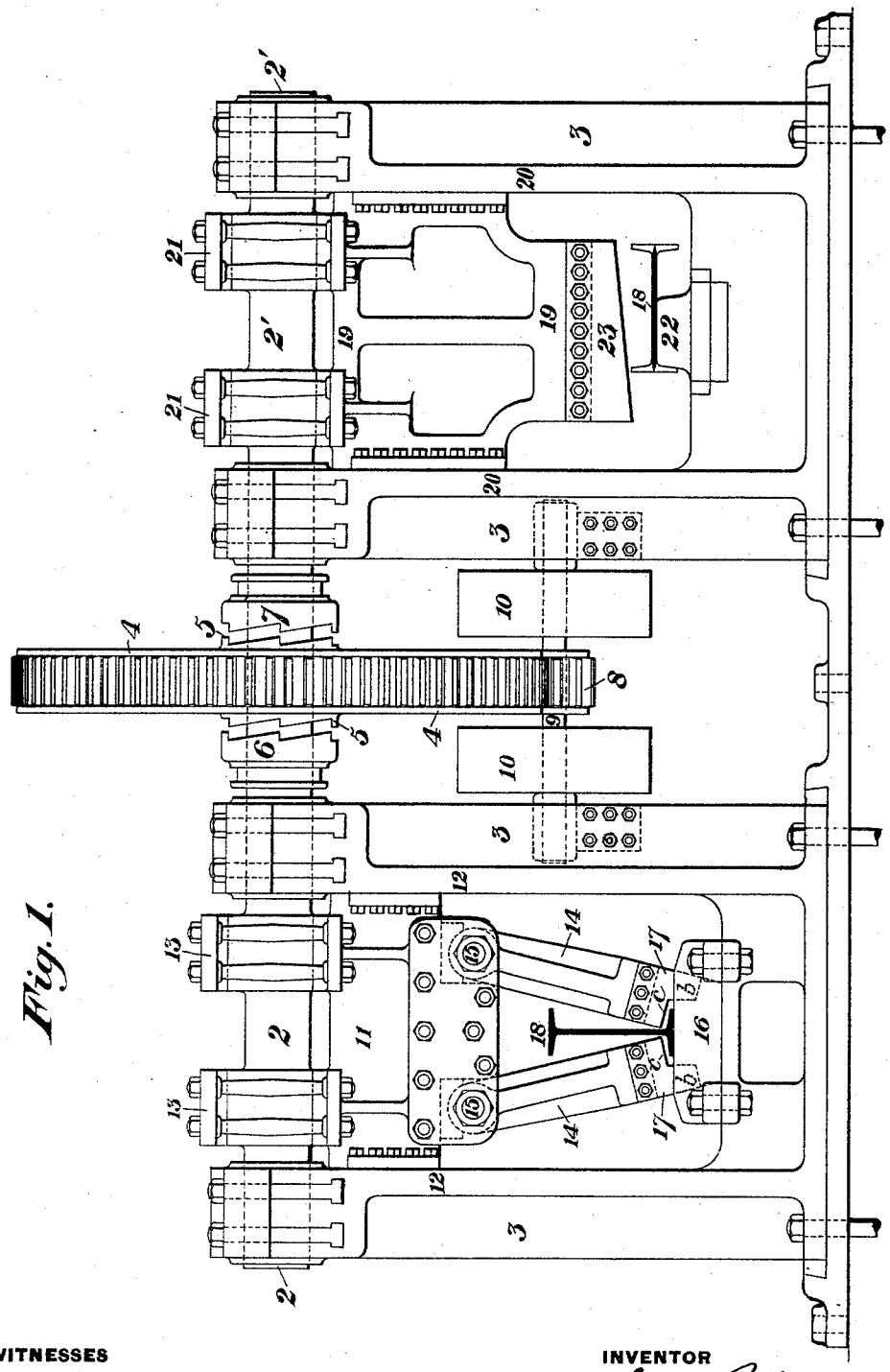

Fig. 1.

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

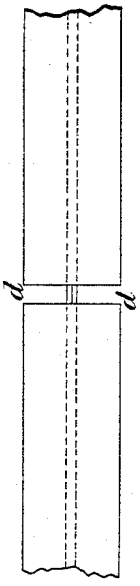


Fig. 5.

Fig. 4.

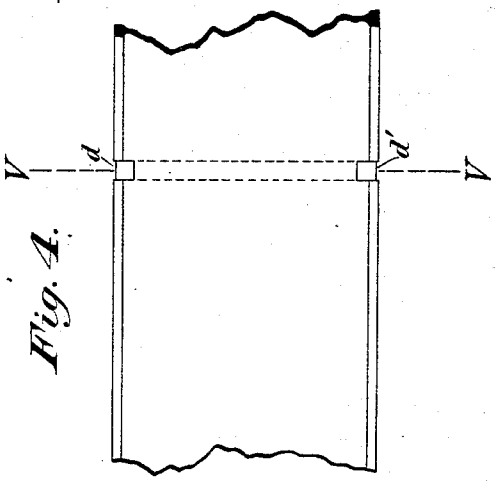
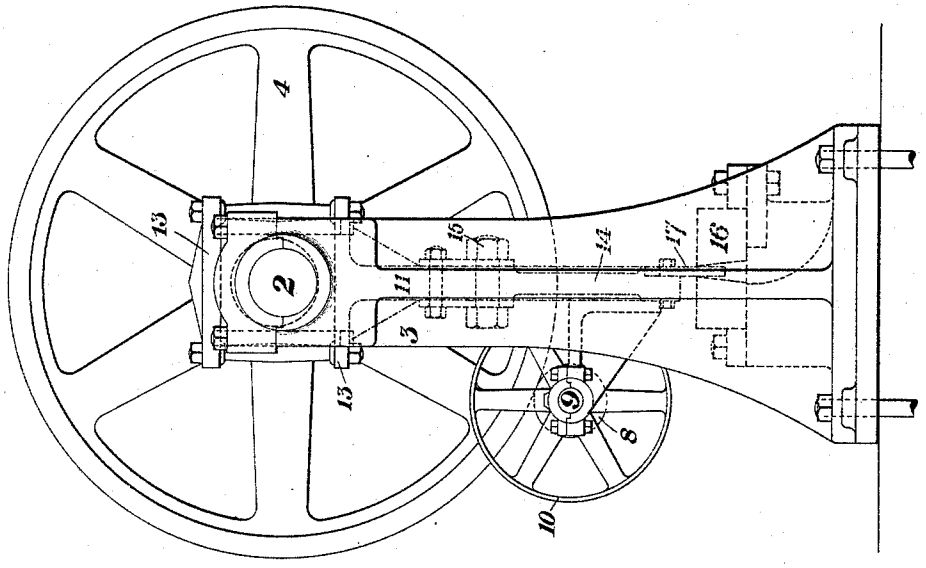


Fig. 2.



WITNESSES

Thomas W. Bakewell

N. L. Gill

INVENTOR

John A. Potter

UNITED STATES PATENT OFFICE.

JOHN A. POTTER, OF MUNHALL, ASSIGNOR OF ONE-HALF TO ROBERT W. GRACE, OF PITTSBURG, PENNSYLVANIA.

ART OF AND MACHINE FOR CUTTING FLANGED BEAMS.

SPECIFICATION forming part of Letters Patent No. 485,981, dated November 8, 1892.

Application filed May 16, 1890. Serial No. 352,021. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. POTTER, of Munhall, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Art of Cutting Flanged Beams and in Apparatus Therefor, of which the following is a full, clear, and exact description.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows in side elevation a machine embodying my invention. Fig. 2 is an end view thereof. Fig. 3 shows in edge view an I-beam of which the flanges have been cut according to the method herein described. Fig. 4 shows the same in plan view, the dotted lines indicating the lines on which the web is cut; and Fig. 5 is a cross-section on the line V V of Fig. 4.

Heretofore flanged beams—such as I-beams, channel-beams, &c., whose flanges are at right angles to the body of the beam—have usually been cut by means of saws. The disadvantages of such mode of cutting are that it is tedious and that the severed ends of the beam are left with rough fins, which must be chiseled off before the beam is in condition for the market. Attempts to cut the beams by transverse shearing and punching operations have been made; but practical difficulties incident to such modes of cutting have rendered them unsatisfactory.

My invention is designed to overcome the difficulties hitherto experienced in cutting flanged beams of the class above mentioned, and it comprises an improved method and apparatus by which the cutting is performed. The new method consists in severing the beam by transverse shearing and punching, in which the flanges and the web are cut at different operations, the flanges being preferably cut first and then the web, though the order of the steps may be reversed so that the web shall be cut before the flanges. The apparatus consists in certain mechanism hereinafter described and adapted to the practice of this method.

The main shaft is made in two parts 2 and 2′, which are journaled in uprights 3, constituting the frame of the machine. The parts of the shaft are set in line, and at their juncture is a gear-wheel 4, having clutch-teeth 5 on both sides, adapted to engage with clutches 6 and 7, which are set on the shaft with feather-and-spline connection, so that they may be moved into contact with the clutch-teeth 5. The gear-wheel 4 is driven by a pinion 8 on a counter-shaft 9, which derives its motion from belt-pulleys 10. The construction and arrangement of the driving-gear may be modified in many ways.

I shall now describe the construction of that part of the machine shown at the left-hand side of Fig. 1, which is adapted to the cutting of the flanges of the beams.

11 is a reciprocating cross-head set between parallel guides 12 and connected with cam yokes or boxes 13, which fit around eccentrics on the shaft 2.

14 14 are knife heads or bars which are connected with the cross-head by pivotal joints 15 and are set in oblique converging positions. The bed-knife block or anvil 16 is formed with a vertical slot, which preferably flares downwardly to afford clearance for the pieces cut from the beam. Separated knife-blades (not shown) may be set in parallel position at the sides of the slot to afford an intermediate space for the passage of the moving knives, or the edges of the block at the sides of the slot may be ground suitably and used as cutting-edges. The ends of the slot are inclined, as shown in Fig. 1, to afford guides for the knife heads or bars, which are formed with tongues *b* at the ends of the knives, fitting in the slot in moving contact with said inclined ends. Other guides may be provided for the knife-heads; but those described are convenient and desirable. The knives 17 are bolted to the ends of the knife-heads and their cutting-edges *c* are adapted to enter the slot in the anvil or knife block and are preferably set at a slight inclination from the horizontal, so that they shall have a shearing action on the flanges of the beam. The operation of this part of the machine is as follows: An I-beam 18 is set on the bed-knife 16, as shown in Fig. 1, so that its flanges at one edge shall be directly beneath the cutting-edges of the knives 17. The shaft 2 is then driven by bringing

the clutches 5 and 6 into engagement, and by means of the eccentrics thereon the cross-head 11 and the knife-heads 14 are moved downwardly. In such downward motion the action of the inclined guides or bearing-surfaces on the tongues *b* causes the knives to descend on the flanges and to converge toward the web, and on meeting the flanges they punch out transverse pieces therefrom, forming therein cuts, as shown at *d* in Figs. 3, 4, and 5. The beam is then upturned on the anvil-block and the flanges on the other edge of the beam are cut in the same manner, as shown at *d'* in Figs. 4 and 5. The web of the beam is next cut by the part of the machine shown at the right of Fig. 1. This comprises a cross-head 19, set between guides 20 and actuated by cam-yokes 21, which encircle eccentrics on the shaft 2'. The anvil-block 22 is formed with a transverse slot, at the sides of which the separated knives are set in parallel position, (or the edges of the slot may be shaped to serve as bed-knives.) This anvil-block is made, preferably, of considerably-less width than the width of the largest beam intended to be cut, since it may thus be used in cutting beams of various sizes. The moving knife 23 is formed with an oblique cutting-edge like that of a shear-knife and is adapted to enter the slot between the bed-knives and to punch and shear out a piece from the beam laid thereon. To cut the web, the beam is laid on the anvil-block 22, as shown in Fig. 1, with the cut portions of the flanges directly beneath the knife 23. The shaft 2' is then rotated by bringing the clutches 5 7 into engagement, and the knife is caused to descend on the web, which it shears by a progressive punching action extending from one side of the beam toward the other. When this punching action has progressed to the opposite side of the anvil-block, the limit of stroke of the knife is reached, and as the cross-head ascends the beam is shifted on the anvil-block, so as to bring the unsupported portion (shown in Fig. 1) upon the surface of the block. The next stroke of the knife continues the cut to the edge of the beam, completing the punching out of a piece extending across the web between the cut portions *d d'* of the flanges, as shown by dotted lines in Fig. 4. It will be understood that when the beam-web and anvil-block are of equal width the cutting of the web may be performed at a single stroke of the knife.

The operations above described complete the cutting of the beam. The cut which is made is quite regular and is without ragged edges, and the work consumes less time and is more economical than any prior mode of cutting known to me. The advantages of the method and apparatus in this regard will be appreciated by those skilled in the art.

In respect of the method of cutting above described the order of the steps may be reversed by first cutting the web and then cutting the flanges. To adapt the machine to this purpose, I may employ a knife 23 of equal width or less width than the web of the beam and cut out the web by one or more transverse cuts.

In respect of the apparatus the form, construction, and relative arrangement of the parts may be varied in divers ways. Thus instead of cutting two flanges at once the machine may be constructed to cut but one flange at a time, and instead of driving the knives 17 and 23 from the same prime driving mechanism the driving parts may be quite separate.

My invention is applicable to the cutting of **I**-beams, as shown in the drawings; but may be used in cutting other forms of flanged beams, such as **T**-beams, channel-beams, and the like.

I claim—

1. An improvement in the art of dividing **I**-beams, channels, angles, and analogous merchant shapes in which the members are substantially at right angles to each other, which consists in punching out by machine-actuated cutting-faces transverse pieces from the flanges, thus forming a slot of sufficient width to receive the web-cutting tool, and then punching and shearing out, also by machine-actuated cutting-faces, a piece from the web in line with the cuts in the flanges, substantially as and for the purposes described.

2. In apparatus for cutting flanged beams, the combination of a knife-block having separated cutting-edges and adapted to support the flanges of a beam, a knife-head, and a knife which moves obliquely relatively to said bed-knife and is adapted to engage the flanges and to punch the same, substantially as and for the purposes described.

3. In apparatus for cutting flanged beams, the combination of a knife-block having separated cutting-edges and adapted to support the flanges of a beam, a knife-head and knife adapted to engage the flange and to punch the same, and a guide set obliquely relatively to the bed-knife and adapted to engage the knife-head, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 14th day of May, A. D. 1890.

JOHN A. POTTER.

Witnesses:
W. H. CORBETT,
THOS. LAMB.