(No Model.) 4 Sheets—Sheet 1.

E. B. MEATYARD.

APPARATUS FOR PRESSING INGOTS.

No. 328,329. Patented Oct. 13, 1885.

Fig 11

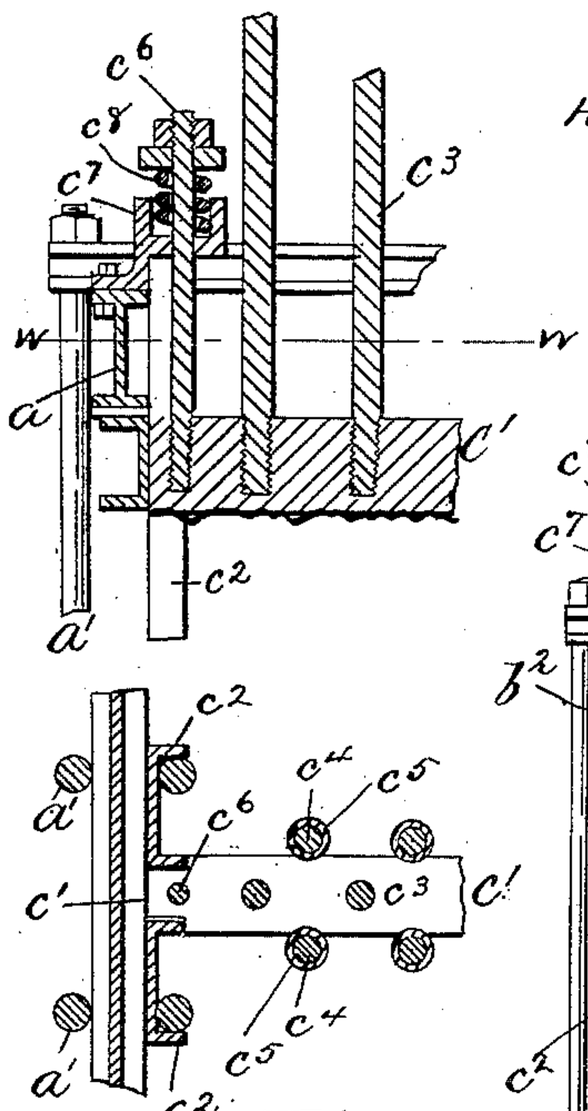

Fig 12

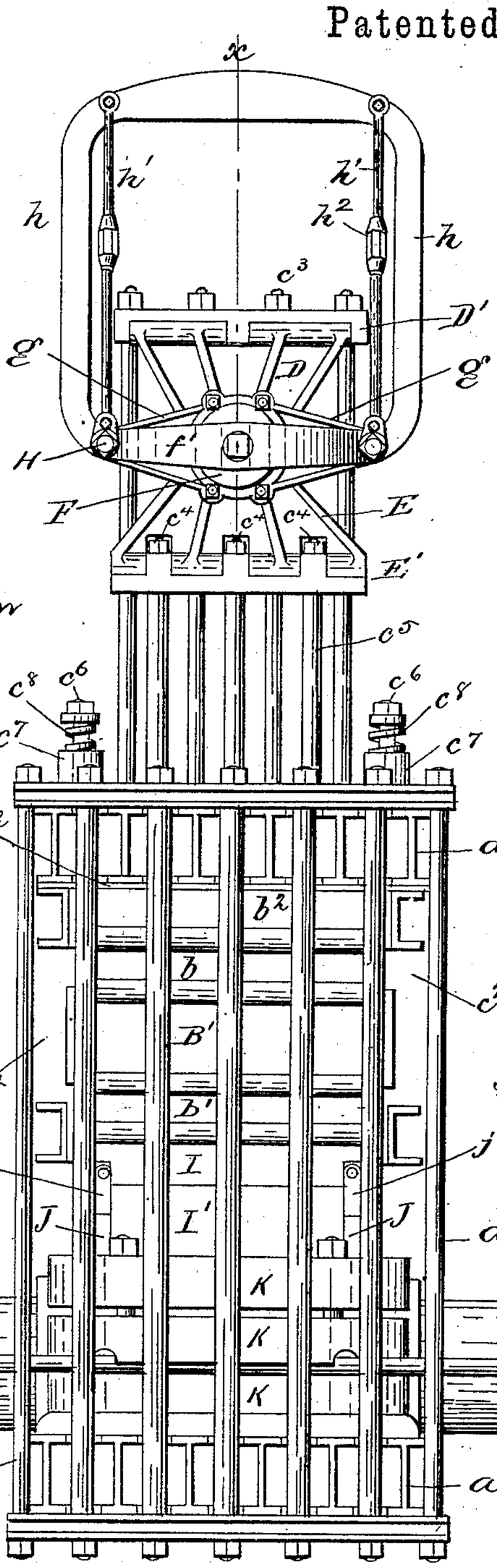

Fig 10

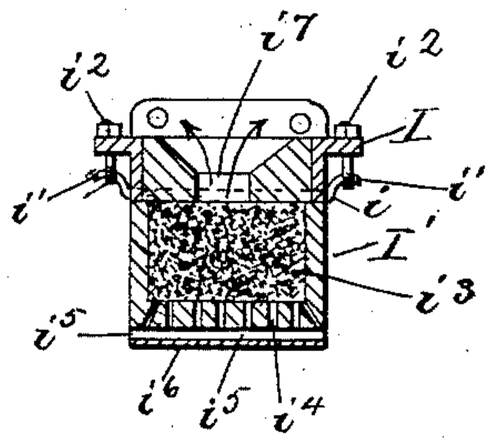

Fig 1

Witnesses
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E. B. MEATYARD.

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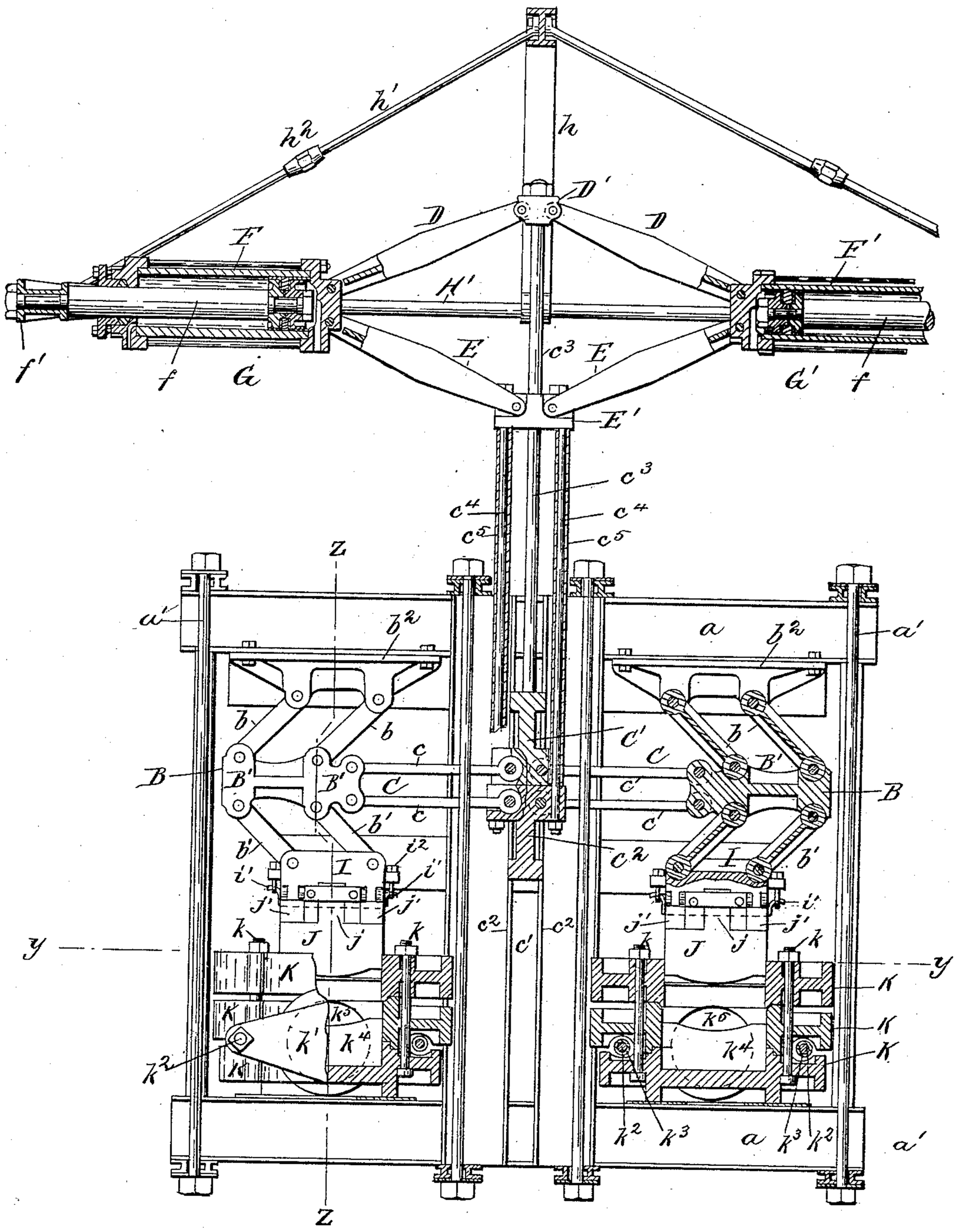

Fig 2.

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(No Model.) 4 Sheets—Sheet 3.

E. B. MEATYARD.

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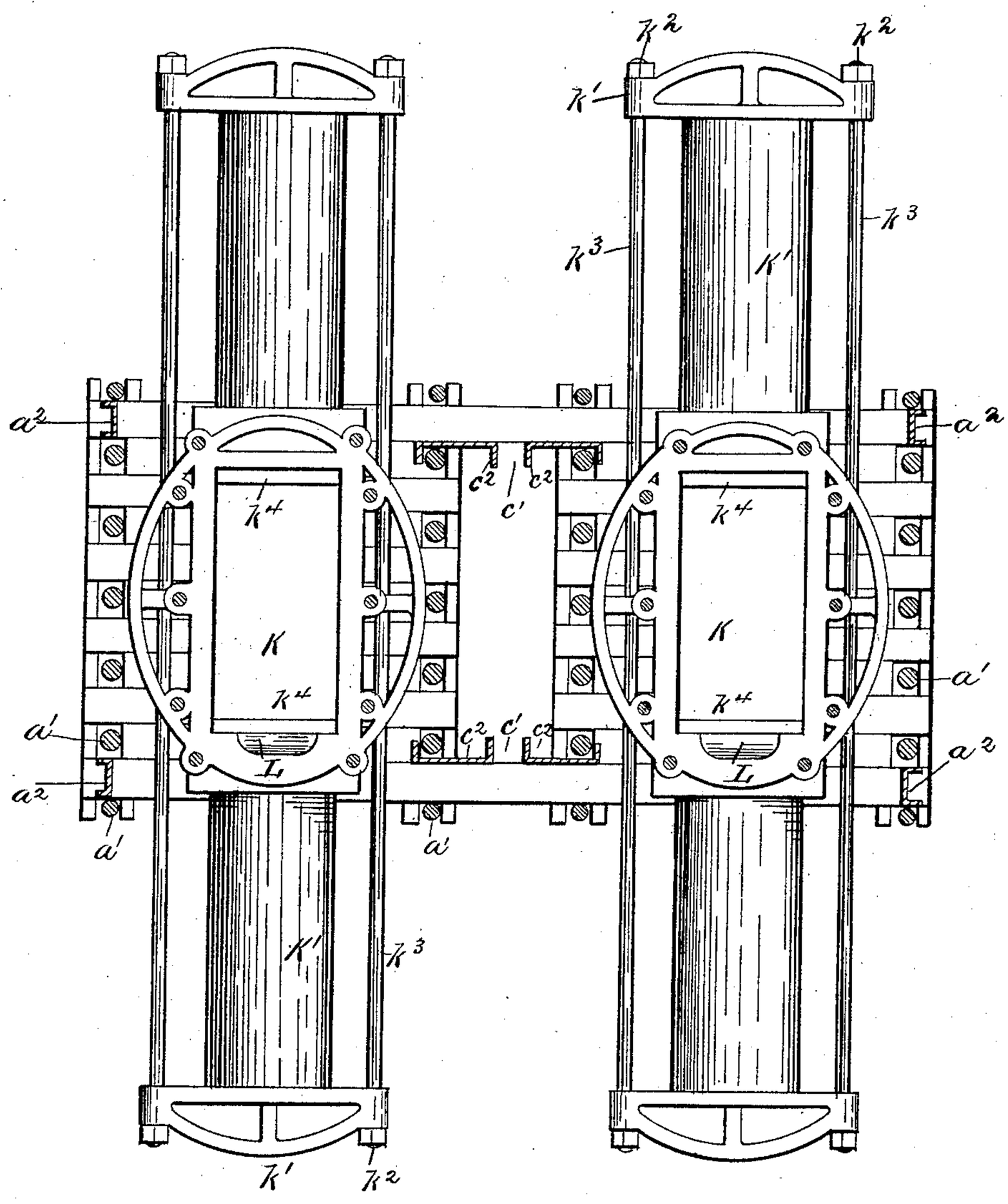

Fig 3

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E. B. MEATYARD.

APPARATUS FOR PRESSING INGOTS.

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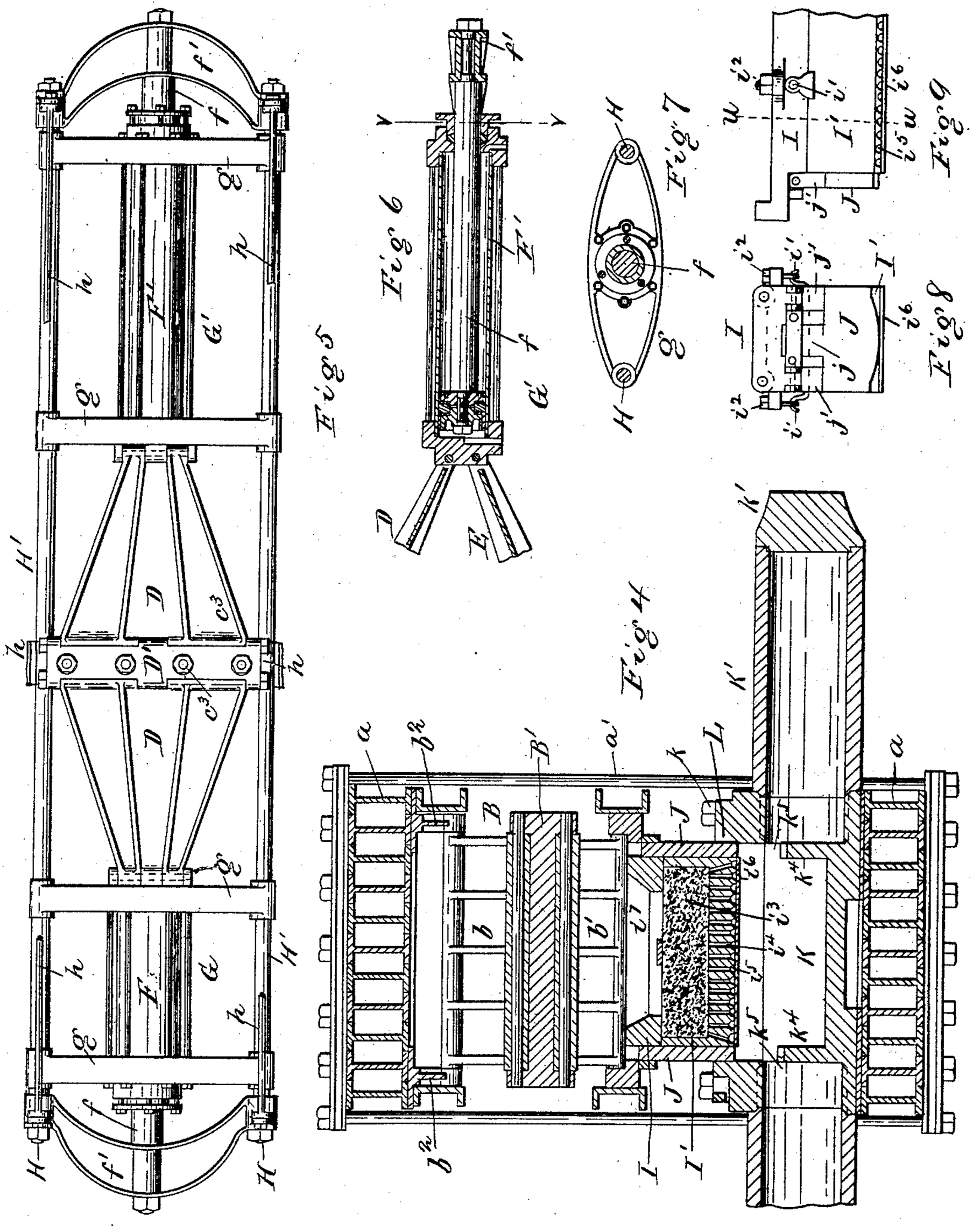

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UNITED STATES PATENT OFFICE.

EDWARD B. MEATYARD, OF LAKE GENEVA, WISCONSIN.

APPARATUS FOR PRESSING INGOTS.

SPECIFICATION forming part of Letters Patent No. 328,329, dated October 13, 1885.

Application filed October 15, 1884. Serial No. 145,613. (No model.)

To all whom it may concern:

Be it known that I, EDWARD B. MEATYARD, a citizen of the United States, residing at Lake Geneva, in the county of Walworth and State of Wisconsin, have invented certain new and useful Improvements in Apparatus for Pressing Ingots, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of a press embodying my invention; Fig. 2, a vertical sectional view of the same, partly in elevation; Fig. 3, a plan sectional view on the line *y y* of Fig. 2; Fig. 4, a sectional view on the line *z z* of Fig. 2; Fig. 5, a plan view showing the jacks and their frame; Fig. 6, a central sectional view of one end of the same; Fig. 7, a sectional view on the line *y y* of Fig. 6. Figs. 8 and 9 are views of the follower detached. Fig. 10 is a sectional view on the line *u u* of Fig. 9; Fig. 11, a detail view, and Fig. 12 a sectional view on the line *w w* of Fig. 11.

Like letters refer to like parts in all the figures.

My invention relates to apparatus for pressing ingots; and it consists in certain novel features, which will be hereinafter described, and then specifically pointed out in the claims.

In the drawings, A represents the frame of a duplex press, which consists, essentially, of upper and lower sets of I-beams, *a*, and bolts *a'* connecting the sets. The upper beams are supported by channel-bars a^2, arranged as shown in Fig. 3. To the upper beams are secured the castings b^2, to which the upper arms, *b*, of the press-toggles B are hinged, the lower arms, *b'*, being hinged to the followers. In the construction shown there are two upper and two lower arms in each press-toggle, these arms being composed of ribbed plates respectively hinged, as above stated, to the follower and casting b^2, and also to a knuckle-piece, B'. To these knuckle-pieces are pivoted the arms *c* of the guide-toggles C, their inner ends being pivoted to cross-heads or knuckle-pieces C' C^2, which move in opposite directions in guiding-grooves *c'*, formed by the channel-bars c^2, as clearly shown in Figs. 2 and 3. The upper cross-head, C', is rigidly connected by rods c^3 to the knuckle-piece D' of the upper actuating-toggles, D, while the lower cross-head, C^2, is similarly connected by rods c^4, passing through the sleeves c^5 to the knuckle-piece E' of the lower actuating-toggles, E. The connecting-rods C^3 slide freely through the knuckle-piece E', and the rods c^4 slide freely through the upper cross-head, C'. The arms of these actuating-toggles are pivoted, as clearly shown in Figs. 2 and 5, to the cylinders F F' of the jacks G G'. The pistons *f* of these jacks have attached to their outer ends arms *f'*, through which pass tension-rods H, connecting the two pistons rigidly, and thereby keeping the jacks in line with each other. The tension-rods H pass through stiff pipes, forming sleeves H', interposed between the arms *f'*. The jack-cylinders are provided with cross-heads *g*, which slide on these sleeves. To further secure a correct alignment on the middle of the sleeves H', a standard, *h*, is secured and tension-rods *h'* are secured thereto and to the arms *f'*, to support the ends of the frame in which the jacks are mounted, the said rods being provided with turn-buckles h^2 to properly tighten them up.

To provide piston-area enough for a tight pinch without being obliged to use only large pistons, and at the same time avoid an unequal arrangement of the weight of the jacks, a short-stroke large piston-jack, G, is employed on one side, and a longer-stroke small piston-jack, G', on the other side.

The small piston-jack G' gives rapidity of operation, and is sufficient to raise the follower, and, in many cases, to set up the press alone; but if in operation it is found that the jack G' is not powerful enough to completely set up the press, the jack G is called into play and will exert sufficient pressure to accomplish this end. Of course, in case two jacks of unequal piston-area are used, only one will be used at a time, and the sum of the strokes of both jacks will be sufficient to set up the press. It is evident that since the frame to which the pistons of the jacks are attached is not connected to the frame-work, except through the actuating-toggles, the said frame and the pistons may move laterally with respect to the main frame to compensate for the difference in length of the stroke of the jacks.

To prevent the weight of the jacks and their frames from bearing too heavily on the

cross-heads of the guide-toggles when the press is off, as shown in Fig. 2, thereby tending to deflect said toggles downward and accidentally set up the press, the upper cross-head has secured to it rods c^6, which pass through castings c^7, attached to the main frame and having seats to receive cushion-springs c^8, which bear against said seats and against suitable projections on the upper end of the rods c^6, formed in the present instance by a washer and nut, as clearly shown in Figs. 1, 11, and 12.

By arranging the actuating-toggles and their operating mechanism above the guide-toggles and the upper set of I-beams the said mechanism and the operator are removed out of the way of the flame of the gas which escapes during the pressing.

The followers and their attachments are constructed as follows: To the follower proper, I, is attached a removable plunger, I′, having attached to it a cross-bar, i, having at its ends hooks i', which pass through eyebolts i^2 on the follower proper, so that by unscrewing the nuts of these eyebolts the plunger may be detached. This plunger is made as hollow as is consistent with strength, the recess i^3 in it being filled with ground silicon or any other porous and at the same time refractory sand or gravel. In the bottom face of the plunger are minute orifices i^4, communicating with the recess i^3 and with fine corrugations i^5 in the face of the plunger, the whole face being covered with asbestus cloth i^6, or any other porous refractory non-absorbent of heat. By this means the face of the plunger is prevented from chilling the metal during the pressing, and the gas contained in the metal is permitted to escape through the grooves and apertures aforesaid and through the sand in the recess i^3, and it finally passes out through a well or opening, i^7, in the follower proper.

The molds consist of a central mold or well, K, and one or more branch molds, K′, communicating with the same. In the present instance two of the latter are shown in connection with each central mold. The central mold, K, is on a higher level than the branch molds, and is preferably in three parts, as clearly shown in Figs. 1 and 2, being strongly constructed to resist heavy bursting strains, and at the same time it may be taken apart to remove the ingot, the parts being connected by bolts k. The upper portion is narrower transversely than the mold below it, but of the same size as the plunger, as clearly shown in Fig. 2, whereby the resistance to the plunger of the skin of the ingot, which is cooled and hardened by contact with the walls of the mold, is provided against. The side or branch molds, K′, are shown as plain hollow tubes tapering slightly, their largest diameter being at their points of communication with the central mold, and having their ends closed by caps k', connected by bolts k^2, passing through tubes or sleeves k^3, to hold the end caps and the branch molds in position. The molds being tapering the ingots may be readily removed after pressing. The end walls, k^4, of the central mold extend upward, as shown in Figs. 2 and 4, leaving an overflow-orifice, k^5, communicating with each branch mold, whereby the metal, upon being poured into the central mold, will overflow into and fill the side molds. These end walls act as knives in conjunction with knives J, attached to the plunger I′, to practically sever the ingots in the branch molds from the metal in the central mold when the press is completely set up.

To permit rapid pouring of the metal, I form at one end of the central mold a gate or pouring-orifice, L, and the knife J adjacent thereto may be raised vertically, its shank j sliding in a suitable mortise or gain in the follower to take it out of the way of the metal while pouring. After pouring the knife is lowered, and two hinged pawls, j', on the follower are swung down to bear against the upper edge of its body to hold it in place during the pressing.

The walls of the central mold may be lined with any suitable refractory non-absorbent of heat to prevent too sudden chilling of the central mass.

In operation, the press being off, the pawls j' are swung up and the knife J raised to permit the pouring of the metal into the central mold, from which it flows into the side molds through the orifices k^5. The three molds being filled the knife is lowered, the pawls swung down, and the press operated to force the plunger downward, thereby compressing the metal in the molds. The knives J and end walls, k^4, finally sever the ingots, and they may be removed while still retaining enough central heat in their cores to regenerate the skin while being worked in the rolls or under the hammer. The gas in the ingots in the branch molds, instead of remaining in their cores, passes into the mass in the central mold, which, being the last poured, is the hottest, and being kept in a molten condition by reason of the asbestus facing of the mold and plunger, the light scoriæ and other impurities will remain on the surface of the same, the gases passing off through the orifices in the plunger, as hereinbefore described.

After each operation the side molds are dropped down by unscrewing the bolts k^2, thereby breaking the small fins connecting the several ingots, which latter are then removed in time to save the molds from superheating. Subsequently the central mold, with the plunger and its knives, is removed and a new set substituted.

By this means dense ingots of great purity and homogeneity are produced with great rapidity.

While the branch molds for pressing rail or other large ingots may be made as shown and described above, molds for pressing tire-ingots with partitions to partially cut them to length must be in two halves meeting on longitudinal seams. When firmly bolted together, they are clamped to the central molds

precisely as are those shown. Molds for casting shafting of uniform diameter for the whole length may also be in two halves.

It is obvious that the press hereinbefore described is applicable to various purposes, although I have shown it as used in conjunction with a particular form of mold for compressing steel ingots. It is also obvious that the mold and plunger hereinbefore described constitute no part of my present invention, which relates to the press, and I do not claim these features in this present application, the same being the subject-matter of an application filed by me September 10, 1884, Serial No. 142,701.

It is obvious that various mechanical alterations and modifications may be made in the details of construction without departing from the principles of my invention, and I therefore do not wish to be understood as limiting myself strictly to the construction shown and described.

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

1. The combination, with the press-toggles and guide-toggles, of the actuating-toggles and their operating mechanism arranged above the latter, substantially as and for the purposes specified.

2. The combination, with the press-toggles and guide-toggles having cross-heads arranged to move in opposite directions, of the upper and lower actuating-toggles rigidly connected with the upper and lower cross-heads, respectively, and means for operating the said actuating-toggles, substantially as and for the purposes set forth.

3. The combination, with the press-toggles, guide-toggles, and actuating-toggles, of jacks arranged to operate the actuating-toggles, substantially as and for the purposes specified.

4. The combination, with the press-toggles, guide-toggles, and actuating-toggles, of a large piston short-stroke jack connected with one end of the latter and a small piston long-stroke jack connected with the other end of the same, substantially as and for the purposes specified.

5. The combination, with the actuating-toggles, of the jacks having their cylinders connected to the said toggles and their pistons secured to a frame otherwise unsupported, substantially as and for the purposes set forth.

6. The combination, with the actuating-toggles and the cylinders connected thereto and having cross-heads g, of the pistons having arms f', tension-rods H connecting the same, sleeves H′ thereon, on which the cross-heads g slide, standard h, and tension-rods h', substantially as and for the purposes specified.

7. The combination, with the cross-head C′, which supports the actuating-toggles and their operating mechanism, of the rods c^6 and cushion-springs c^8, substantially as and for the purposes specified.

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