No. 641,395. Patented Jan. 16, 1900.

A. KNÜTTEL.

MACHINE FOR MAKING CORES FOR CASTINGS.

(Application filed Sept. 12, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1

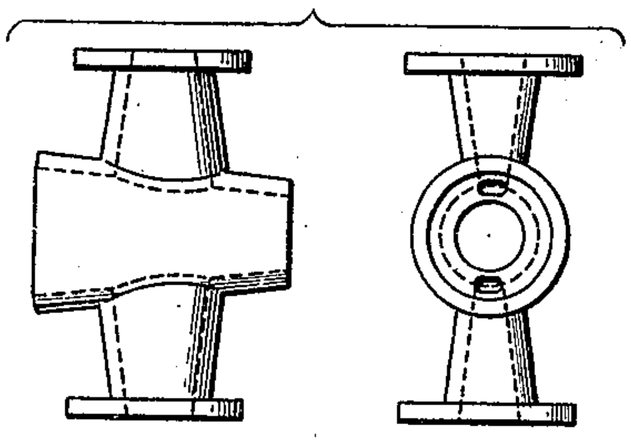

Fig. 2

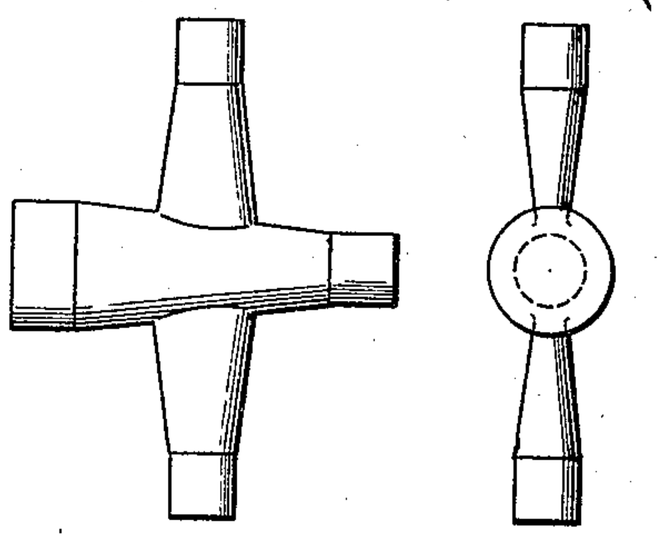

Fig. 3

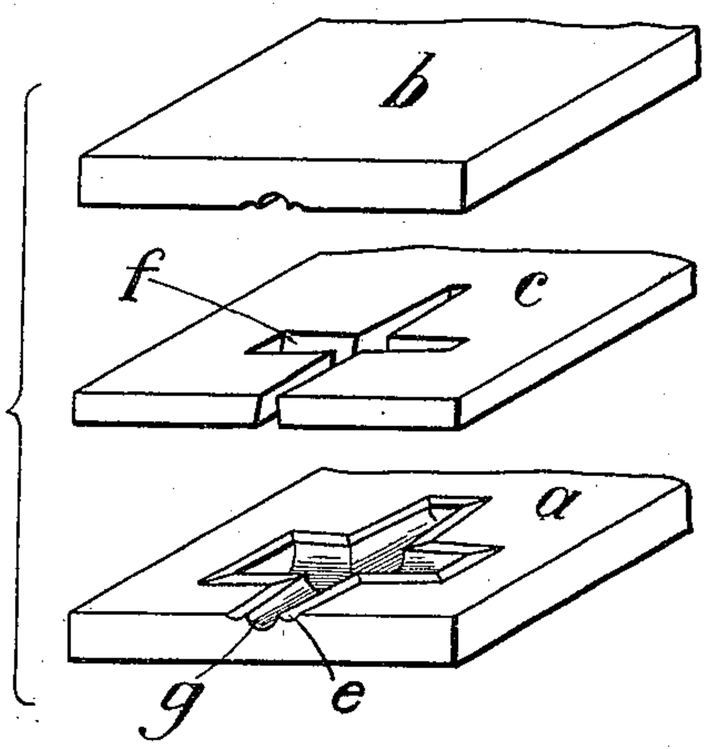

Fig. 4

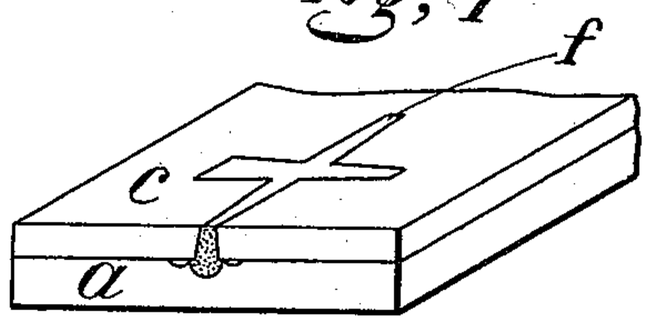

Fig. 5

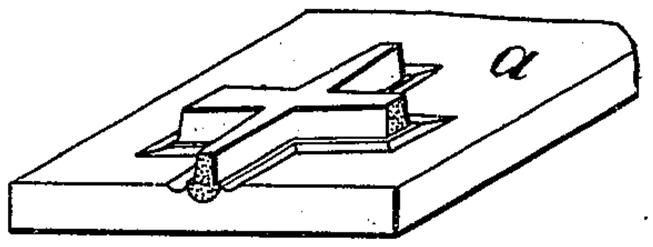

Fig. 6

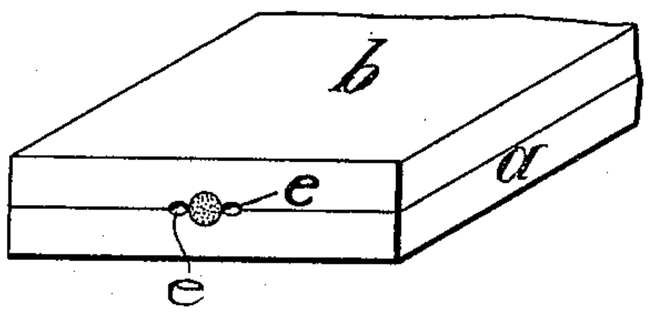

Fig. 7

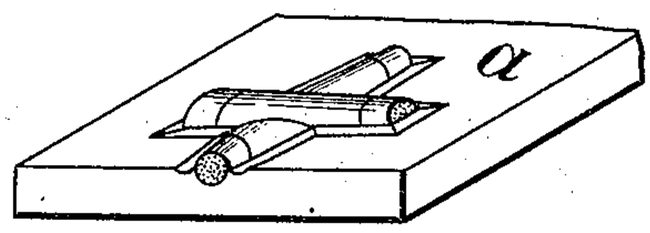

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Fig. 8.

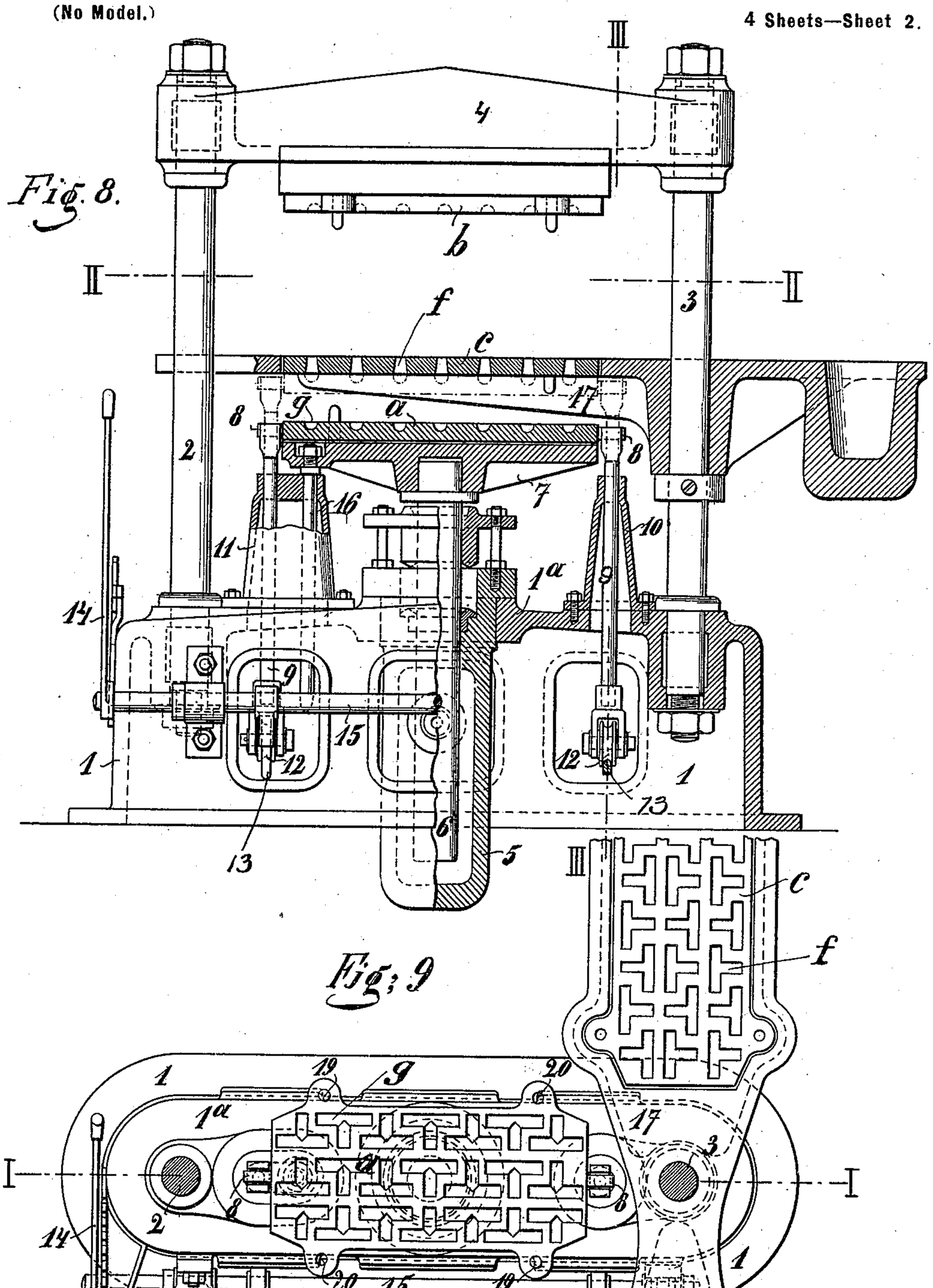

Fig. 9.

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Fig. 10.

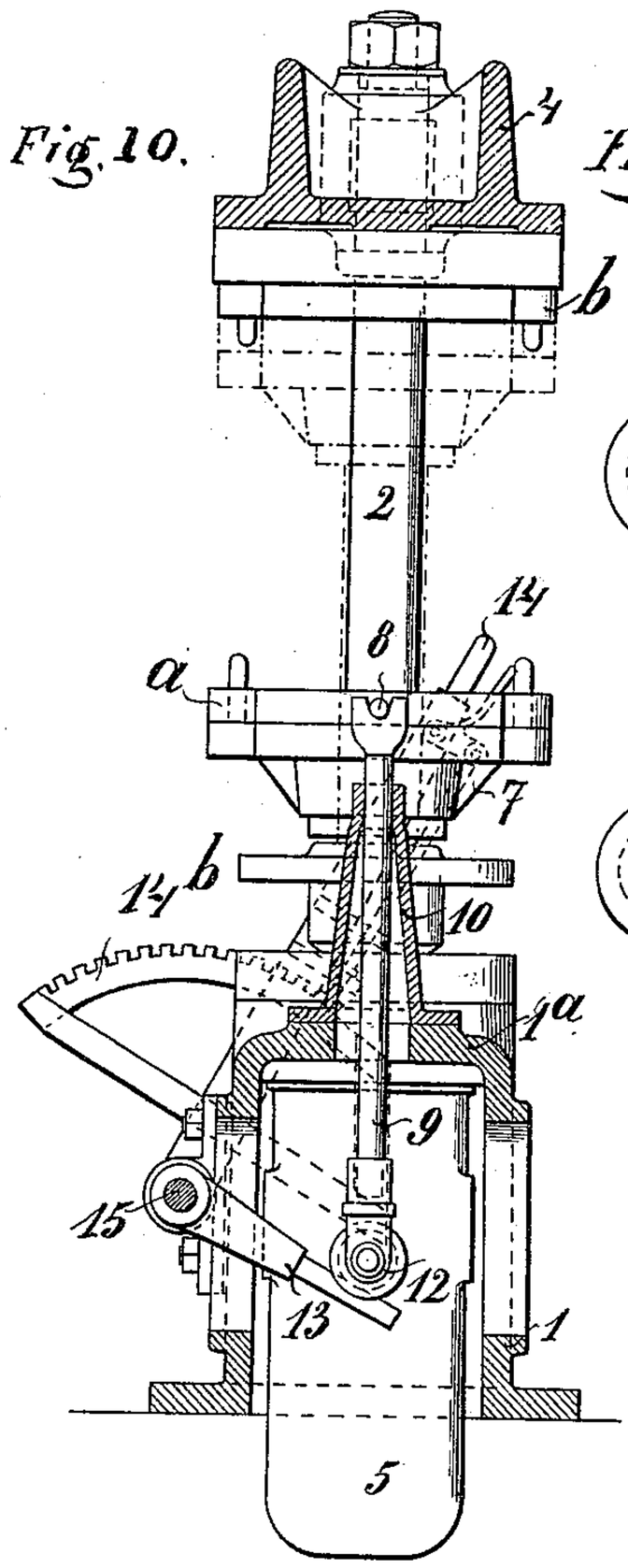

Fig. 12.

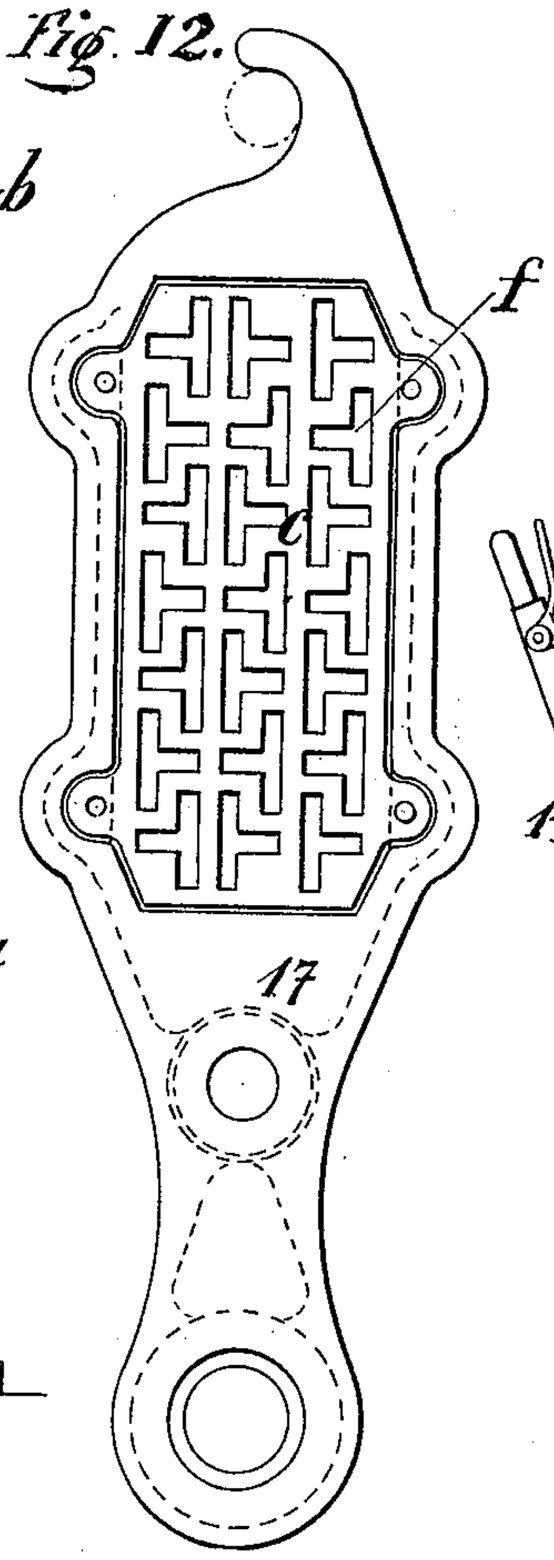

Fig. 11.

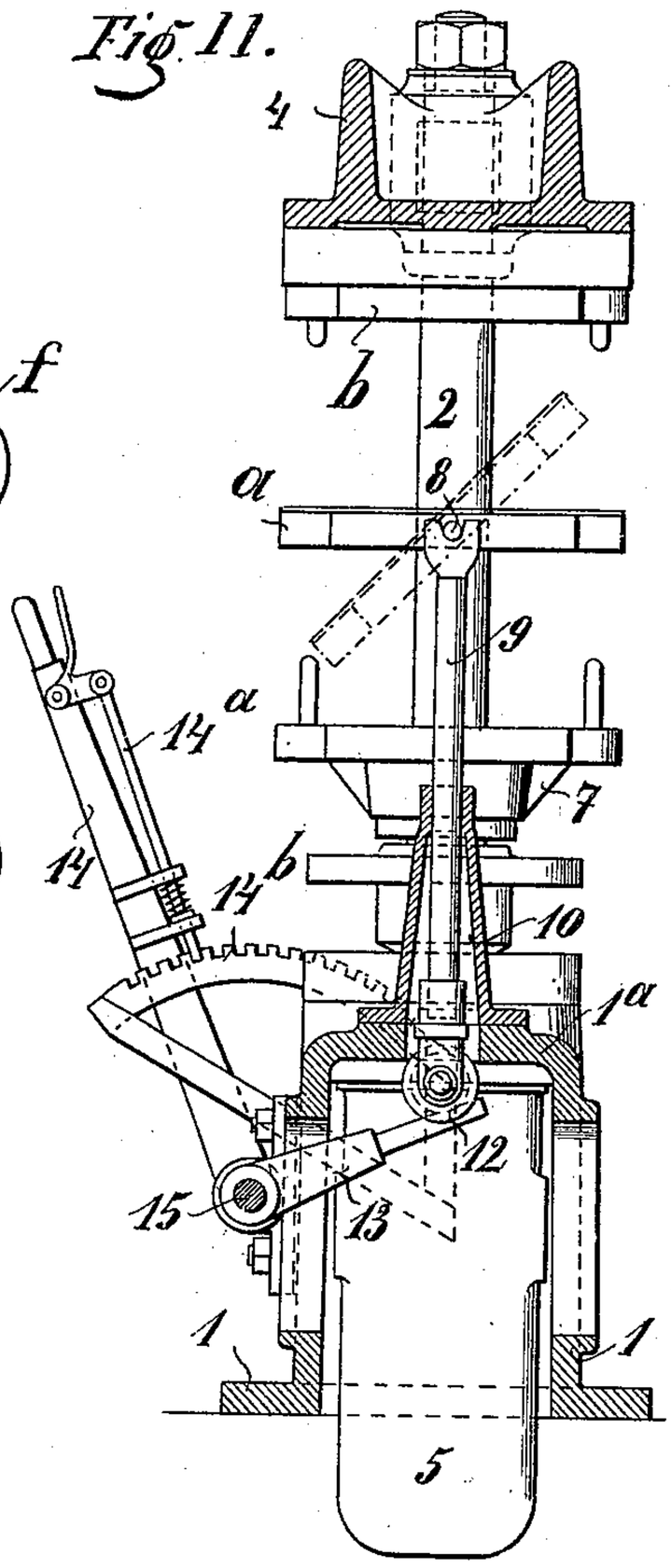

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Fig. 13.

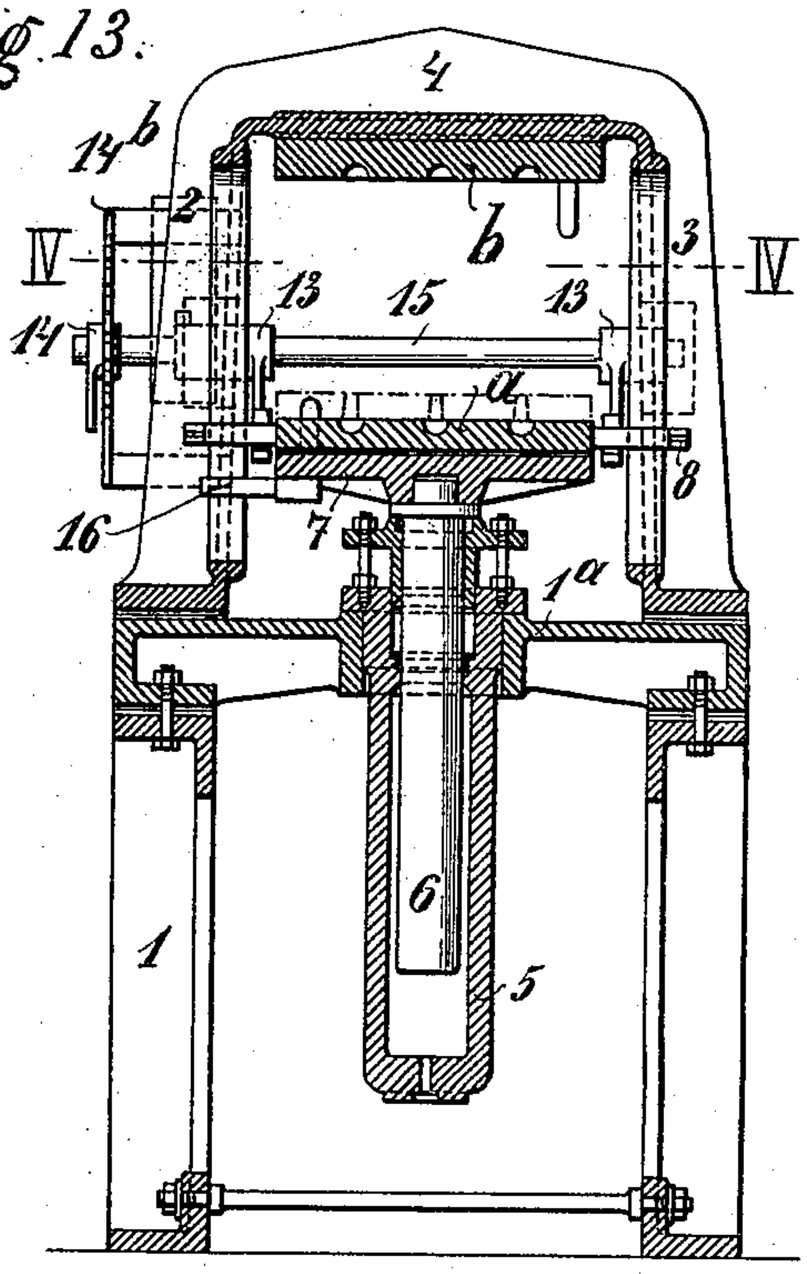


Fig. 14.

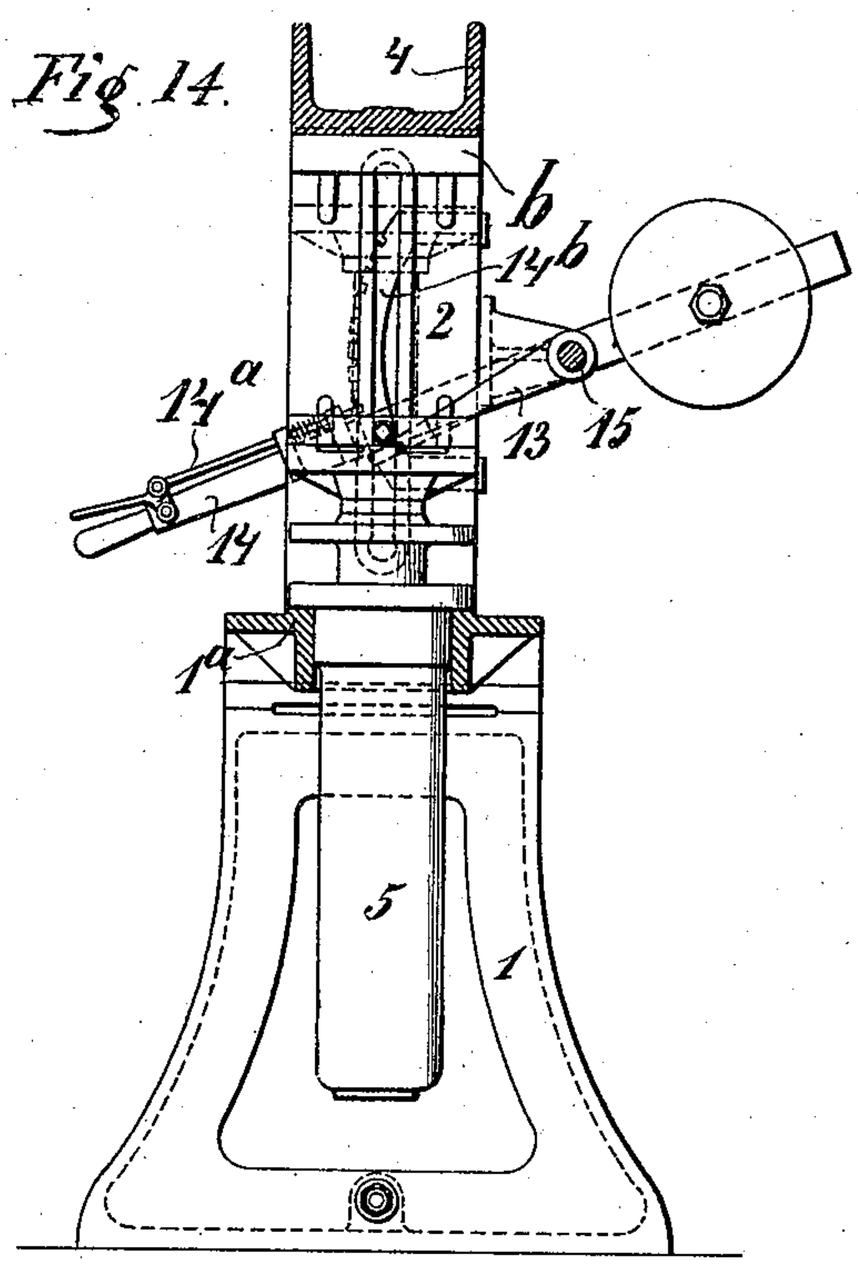


Fig. 15.

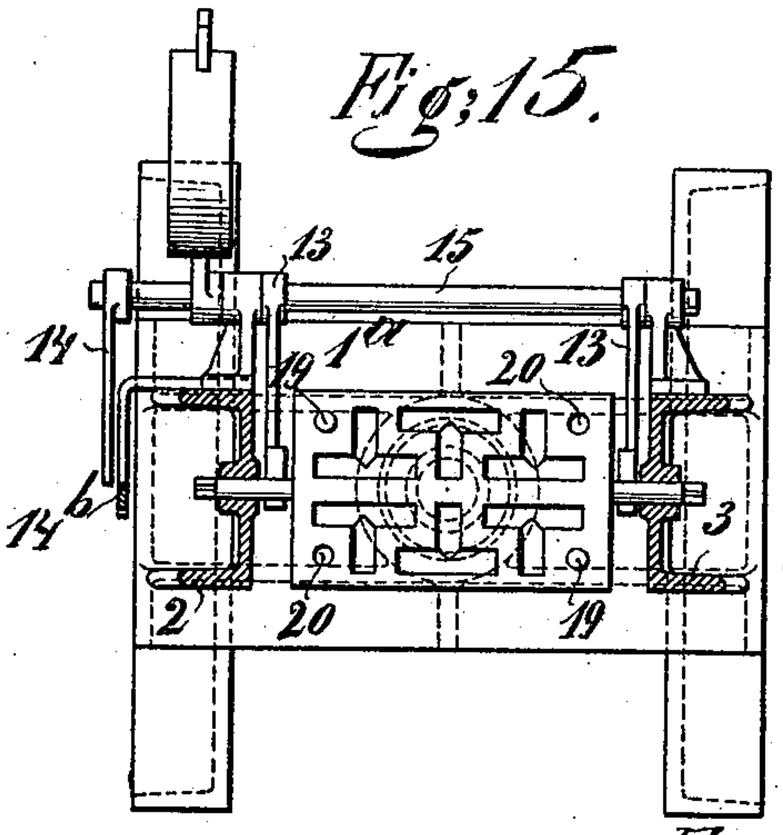


Fig. 16.

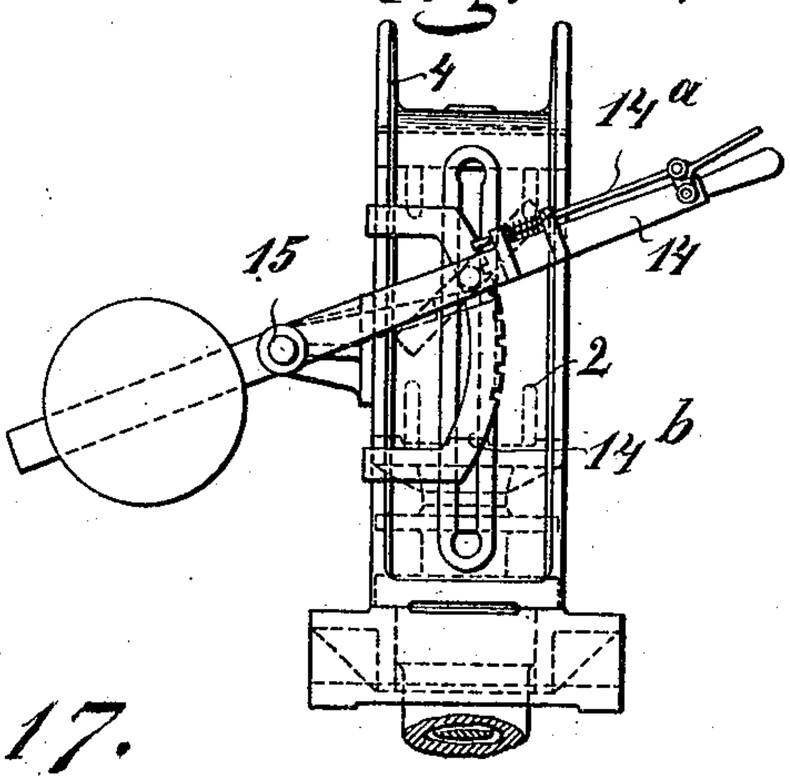
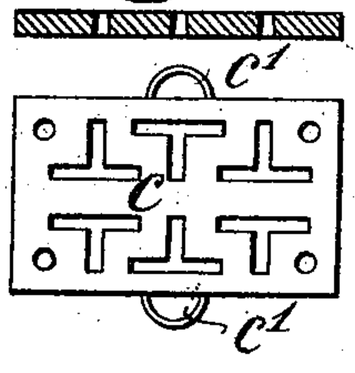


Fig. 17.



Witnesses;
Otto König

Inventor;
Albert Knüttel.

UNITED STATES PATENT OFFICE.

ALBERT KNÜTTEL, OF REMSCHEID, GERMANY.

MACHINE FOR MAKING CORES FOR CASTINGS.

SPECIFICATION forming part of Letters Patent No. 641,395, dated January 16, 1900.

Application filed September 12, 1899. Serial No. 730,255. (No model.)

To all whom it may concern:

Be it known that I, ALBERT KNÜTTEL, a citizen of the German Empire, residing at Remscheid, in the province of Rhenish Prussia, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Machines for Making Cores for Castings; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to use the same.

My invention relates to an improvement in machines for making cores for such castings of comparatively small size which are required in large quantities—such as fittings, for instance. It has for its object to make such cores not only mechanically much quicker than by hand, but also to make them more accurate and uniform and also more durable or harder. Hitherto such cores have been made by the use of two molds having half of the form in each, both being held together by screws, and the molding-sand is then filled in the hollow form and pressed or stamped tight therein. Then the screws are loosened and the two half-molds are taken asunder and the finished core is taken out.

By making cores with my new machine I proceed in a new and different manner. I make first a core having approximately the same volume of the finished core, but not yet the exact shape of the same, one half being formed in a slightly-differing mold by means of strong pressure and by replacing the differing half-mold by a mold of the exact form required for the finished core. This then receives its true shape. By this mode of working the sand having the wrong shape is by pressure formed into the true shape, and the cores produced, therefore, have a very great consistency and are harder than hand-made cores. All the operations thereby are carried out in such a manner that the cores have not to be transferred from one place to another or touched by hand before being completely finished, and I have so succeeded that a boy can make seven to eight times as many cores in the same time as by hand—say four thousand five hundred to five thousand cores for pipe-fittings, for instance, per day.

I attain the desired object by means of the machine described hereinafter and shown on the accompanying drawings, in which—

Figure 1 shows as an example an ordinary water-coke for which a core is to be formed in two views. Fig. 2 shows the core required in making such a coke also in two corresponding views. Fig. 3 shows in three perspective views the molding-plates required with my new machine. Fig. 4 shows the making the provisional core by means of the lower and middle molding-plate. Fig. 5 shows the provisional core lying in the lower molding-plate, the middle one being taken off. Fig. 6 shows the making of the finished core by placing the upper molding-plate on top of the provisional core in place of the middle plate. Fig. 7 shows the product thus received lying on the lower molding-plate, the upper one being taken off. Fig. 8 is a vertical view, partly in section, along line I I of Fig. 9, of one form of execution. Fig. 9 shows a top view of the machine seen below line II II of Fig. 8. Fig. 10 is a section of Fig. 8 along line III III of Fig. 8, showing the mechanism for raising the lower molding-plate. Fig. 11 is a similar view showing the lower molding-plate in its highest position ready for being turned around. Fig. 12 is a detail view in plan of the intermediate molding-plate. Fig. 13 shows a modification of the machine in a vertical section for use with an intermediate molding-plate to be put on and taken off by hand. Fig. 14 is a side view of this construction. Fig. 15 is a sectional top view seen below line IV IV of Fig. 14. Fig. 16 is an outside elevation of the upper part of the machine seen from the left of Fig. 13. Fig. 17 shows the intermediate molding-plate used with this machine for being set in place and taken off by hand.

In the following description similar or equivalent parts are indicated by the same ciphers or letters.

In the machine shown by Figs. 1 to 12, where the intermediate molding-plate is mechanically combined with the frame of the machine, there are fixed on the table 1^a of the frame 1 two standards 2 and 3, which at their head are connected by a cross-girder 4, to the lower side of which is fixed the upper molding-plate *b*. In the middle of the frame 1 is fixed the press-cylinder 5 of a hydraulic

press, the piston 6 of which has a table 7 fixed to its top, and on this rests the lower molding-plate *a*. This plate can be raised up to the lower face of the upper molding-plate by the piston 6. The lower plate is provided at its right and left side with pins 8, which are supported by studs or poles 9. These are guided in boxes 10 and 11, respectively, bolted to the table 1^a of the frame 1, and at their lower ends are fixed rollers 12. These rollers rest upon levers 13, fixed each to a spindle 15, to which is also keyed a lever 14, so that by turning this lever one way or the other the poles 9 can be lowered or raised, and with them the molding-plate *a* carried in their forked upper ends. When raised high enough, the molding-plate can be swung around, as indicated in dotted lines in Fig. 11.

By means of the segment 14^b and the latch 14^a (like a locomotive steering-gear) the amount to which the molding-plate *a* is raised can be fixed at any height desired.

A bar 16, arranged in the box 11, prevents the press-table 7 from turning on the piston.

At a suitable distance between the lowest position of the lower molding-plate and the upper molding-plate is in the examples shown arranged a third molding-plate *c*. It is held on the column 3, so that it can be turned around this column and placed either exactly over the lower plate *a* or that it can be turned entirely out of its way, Figs. 8 and 9. The special form of the three molding-plates is shown in Figs. 3 to 7.

In the plates *a* and *b* in the upper side of the one and in the lower side of the other are engraved hollows *g*, similar in shape to the half-forms of the cores to be formed, so that when the plates are put one upon the other these hollow forms exactly make together the complete mold of a core. Round about the borders of the forms a groove *e* is made so as to form a sharp edge along these borders. This has for its purpose to cut off superfluous sand and allow it to fall into the grooves, so that when the plates are pressed together they will fit tightly one upon the other and no sand will be left between their even faces.

The third plate *c* is carried on an arm 17, placed with a corresponding eye around the column 3 and held in proper height by a collar. It is provided with holes *f* going right through it and corresponding in place to the excavations of the plates *a* and *b*. At the lower side the edges of the holes *f* correspond pretty exactly to the shape of the mold in the lower plate *a*. Toward the upper side they diminish a little, so that a "provisional" core—that is to say, a core having nearly the shape of the finished cone—can be formed in them. The thickness of this plate therefore is made such that the volume of sand forming this provisional core exactly corresponds to the volume of sand required for the finished core.

In order to bring the three plates always exactly upon each other with their molds, guide-pins 19 are arranged, fitting into holes 20, when the plates are put together.

The manner of working of the described machine is as follows: By means of the elements 9 12 13 14 15 the lower plate *a* is raised so much that its upper face touches the lower face of the plate *c*. The molding-holes in *a* and *c* having been powdered with coal powder, as is done in ordinary molding, the holes are filled with sand, and this is pressed tight therein, and the superfluous sand is taken off by a scraper moved over the upper face of the plate *c*. Now this plate is beaten a little, so as to loosen the sand in its holes, and the lower plate is moved downward. It now contains the provisional cores, as shown in Fig. 5. The plate *c* is now turned on its column horizontally by ninety degrees, so as to bring it out of reach of the lower plate, and this is now raised by the hydraulic press and pressed firmly with its upper face against the upper plate *b*. By this operation that part of the sand standing over the surface of the plate *a* is formed into the proper shape of the core given it by the cavities in the upper molding-plate. While raising the piston and the lower plate, the forked bars 9 are also raised, so that when the piston and the table 7 are going back again the molding-plate *a* will be caught by its pins 8 in the forked parts of said bars 9, Fig. 10. In placing then a suitable piece of sheet metal upon the plate *a*, holding it by hand, and turning the plate by one hundred and eighty degrees, as indicated in Fig. 11, the cores can then be taken off and placed away for the drying-stove. By turning the plate *a* now again by one hundred and eighty degrees and lowering it to its original position it will be ready for a new lot of cores to be formed.

The modification of the machine shown by Figs. 13 to 17 varies from the one described and shown only in its exterior form and by the manner of putting in place and taking off the intermediate molding-plate. In all other respects—that is to say, with regard to its working—it is identical with the first machine, they being merely mechanical equivalents which have been interchanged in order to make this machine lighter for small work and for making cores for smaller articles and where a less quantity is required, as will be seen from the description following: The piston 6 of the hydraulic press carries the table 7, and upon this is placed the lower molding-plate *a* of similar construction, as in the preceding case, and underneath the cross-beam 4 is fixed the upper molding-plate *b*. The pins 8 of the lower plate in this case are guided between slots of the side standards 2 3 of the machine-frame and they may be also supported by levers 13, keyed to the shaft 15, at one end of which is also fixed the lever 14, which by means of the latch 14^a and the segment 14^b may be locked so as to fix the amount of raising the molding-plate at any height desired

and to be able to turn it, as indicated in dotted lines in Fig. 14. The intermediate molding-plate *c*, Fig. 15, in this case instead of being fixed to the machine-frame is provided with handles *c'*, by means of which it can be put in and taken out of the machine by hand. In all other respects the three molding-plates are of equal construction as those first described. The working of this machine is materially the same as that of the first one; but since the intermediate plate is put on by hand there is no necessity of raising the lower one for putting on the intermediate plate and set them right for the formation of the provisional core, and it will thus be seen that the differences in both are merely of such minor importance and only due to the structure of the same.

Other variations in the building and framework of the machine and also in arranging certain working parts may be made, and I do not limit myself to the exact forms shown when making machines of larger or smaller size.

I am also aware that molding-machines for cores by which the formation of the cores is effected by pressure have been made before, and I do not claim, broadly, such machines as my invention; but

What I do claim is this:

1. In a machine for molding cores, in combination with a frame 1, standards 2, 3, a cross-beam 4 connecting the top ends of said standards, a hydraulic-press cylinder 5 fixed to the table of said frame, a piston 6 working in said cylinder and carrying a table 7, an upper molding-plate *b* fixed permanently to the lower side of said cross-beam 4, and having the mold of the upper half of the core to be formed engraved in its lower face, a removable molding-plate *a* upon the table of the hydraulic press and having the mold of the lower half of the core to be formed engraved in its upper side, and a removable intermediate molding-plate *c* having holes worked right through it corresponding in exterior outlines to the shape of the core to be formed and of such thickness that the volume of the said holes equals the volume of the upper half-core, the whole as illustrated and described and for the purpose set forth.

2. In a machine for molding cores, in combination with a frame 1, standards 2, 3, a cross-beam 4 connecting the top ends of said standards, a hydraulic-press cylinder 5 fixed in the middle of the table of said frame, a piston 6 working in the cylinder 5 and carrying a table 7, a molding-plate *b* fixed permanently to the lower side of said cross-beam 4, a molding-plate *a* held removably on the table 7, said plate *a* having pins 8 at the sides facing the standards 2, 3, an intermediate molding-plate *c*, capable of being inserted between the upper and lower molding-plates *b* and *c*, boxes 10, 11 bolted to the table of the frame 1 guiding vertically bars 9 forked at their upper ends and capable of carrying the lower molding-plate *a* by the pins 8, a shaft 15 fixed to the frame of the machine, levers 13 keyed to said shaft and supporting by their free ends the bars 9, a lever 14 keyed to one end of shaft 15 and engaging by a latch 14^a with a toothed segment 14^b on the frame 1, the whole as described and illustrated and for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

ALBERT KNÜTTEL.

Witnesses:
R. E. JAHN,
OTTO KÖNIG.