A. A. HUSEBY.

PROCESS OF AND APPARATUS FOR CASTING PIANO PLATES.

APPLICATION FILED SEPT. 10, 1910.

978,452. Patented Dec. 13, 1910.

3 SHEETS—SHEET 1.

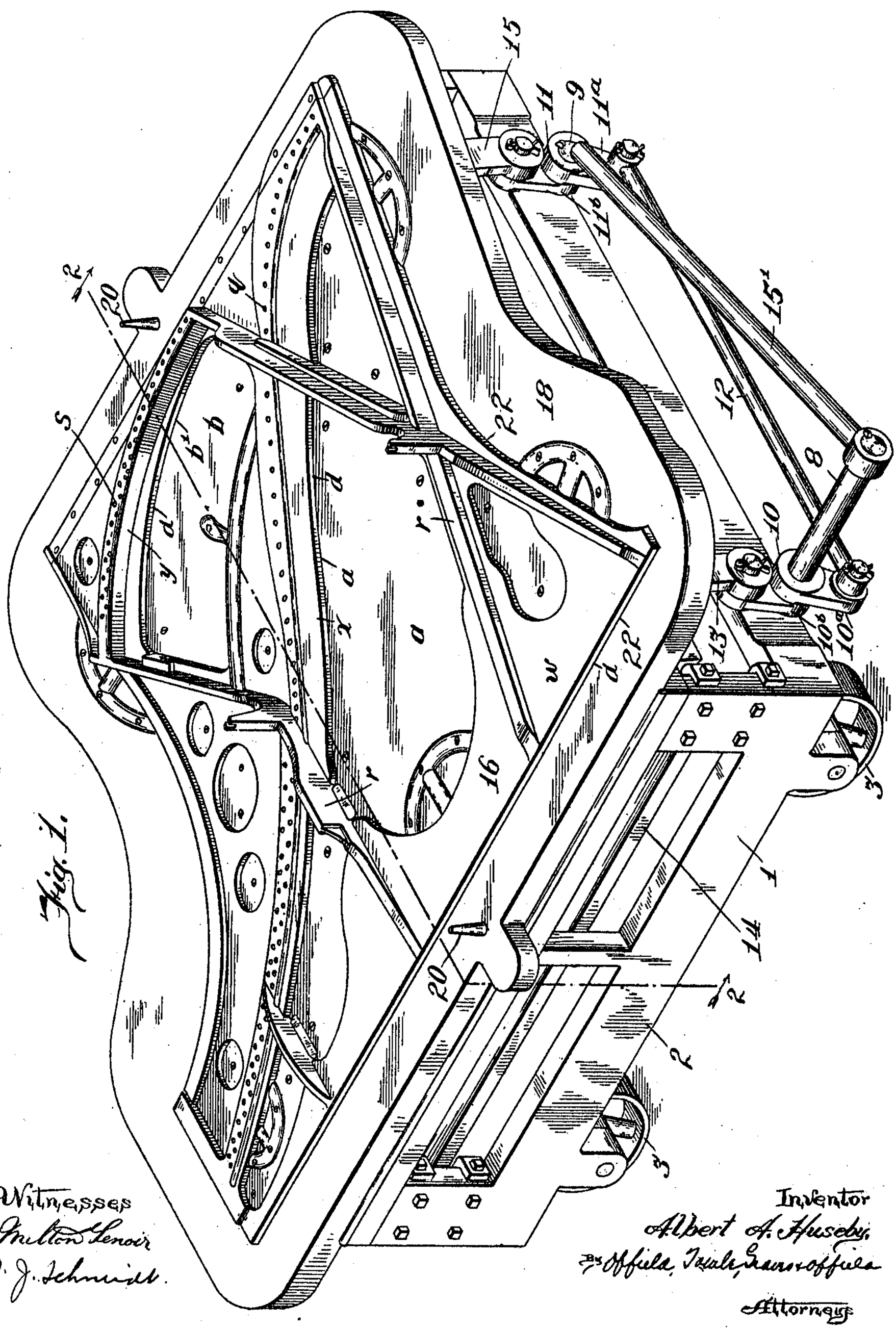

Fig. 1.

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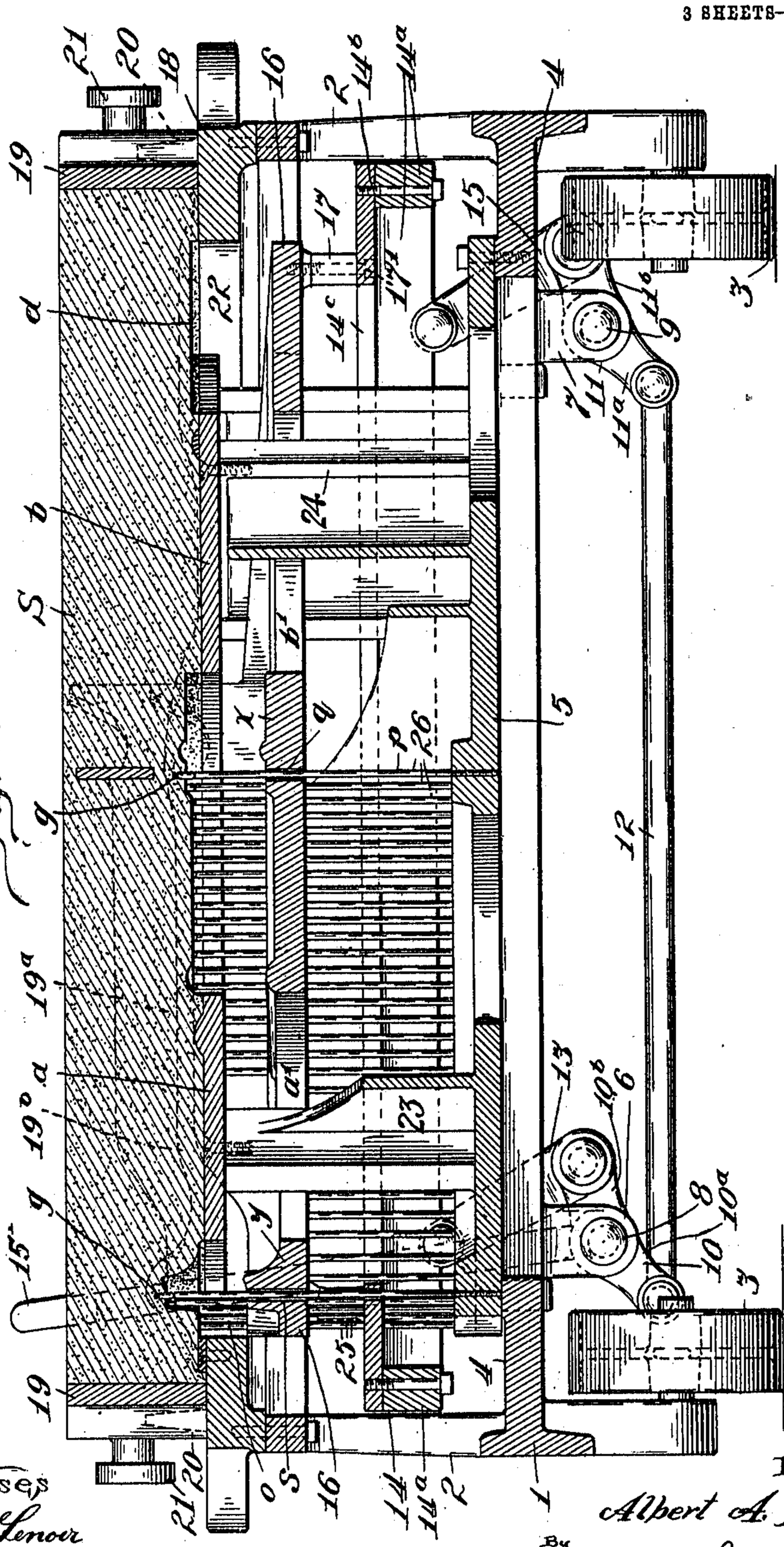

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3 SHEETS—SHEET 3.

Fig. 3.

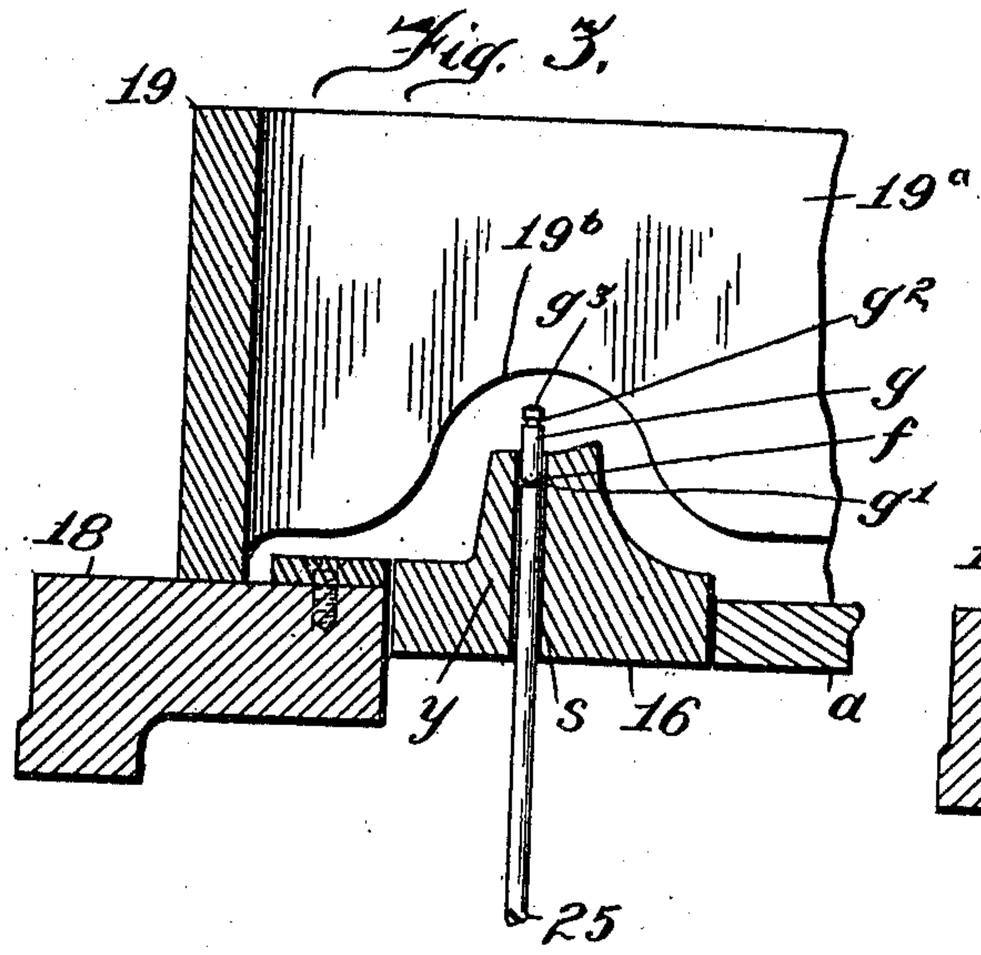


Fig. 4.

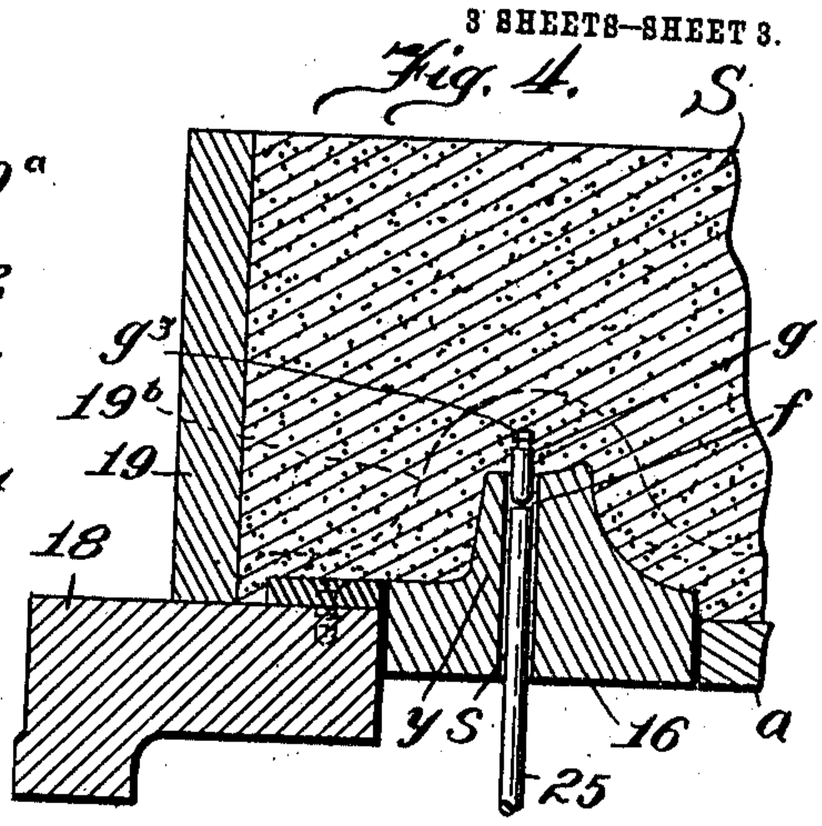


Fig. 6.

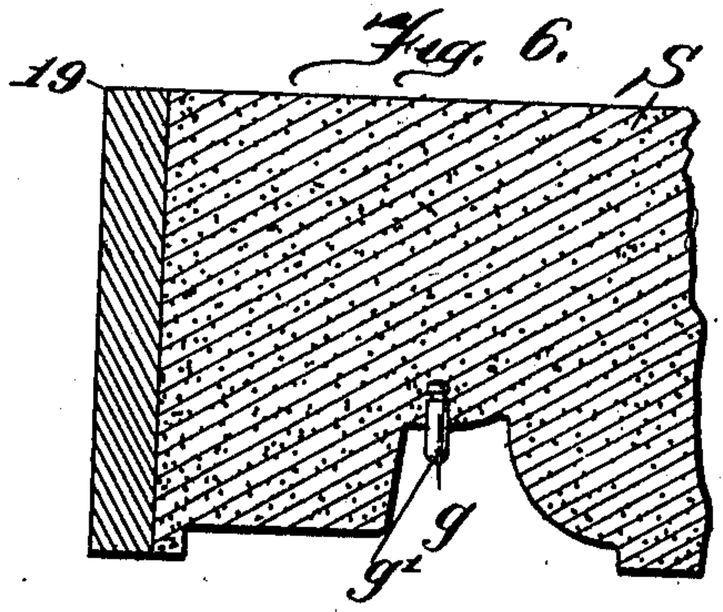
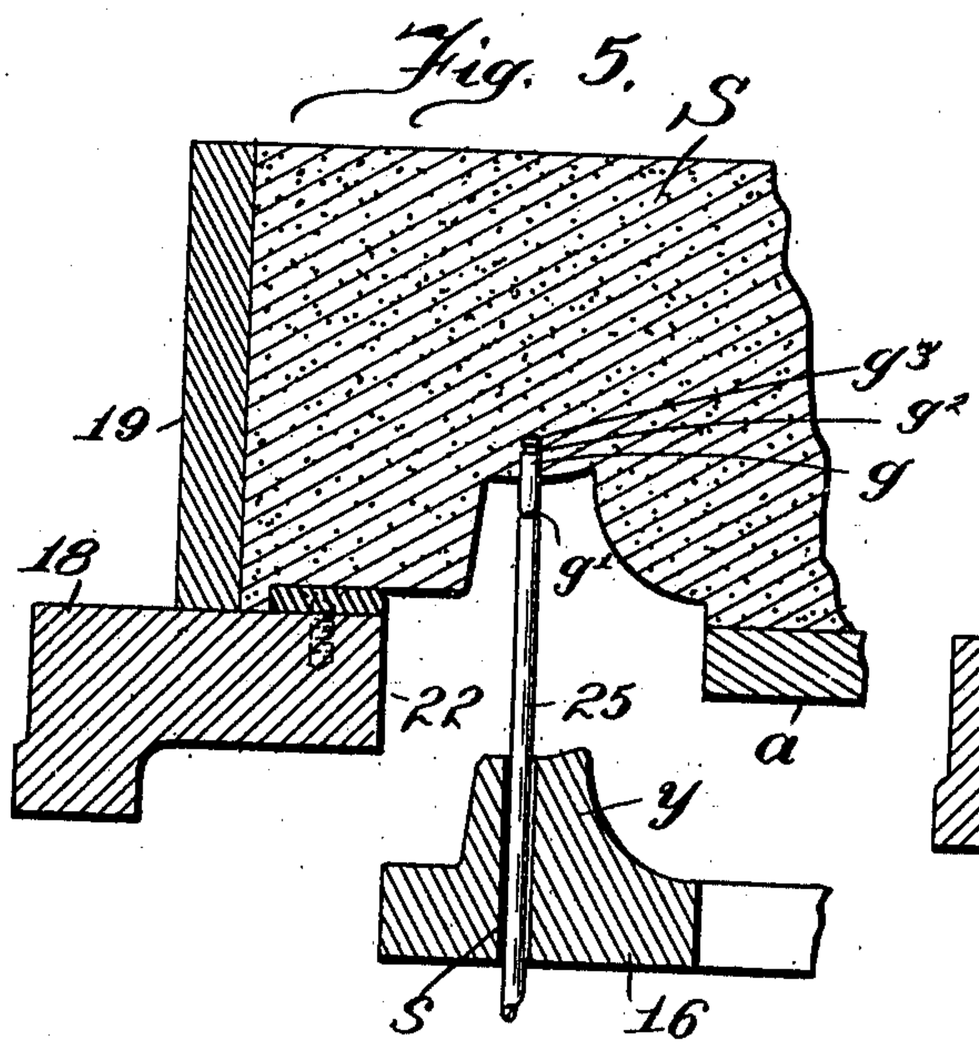


Fig. 5.



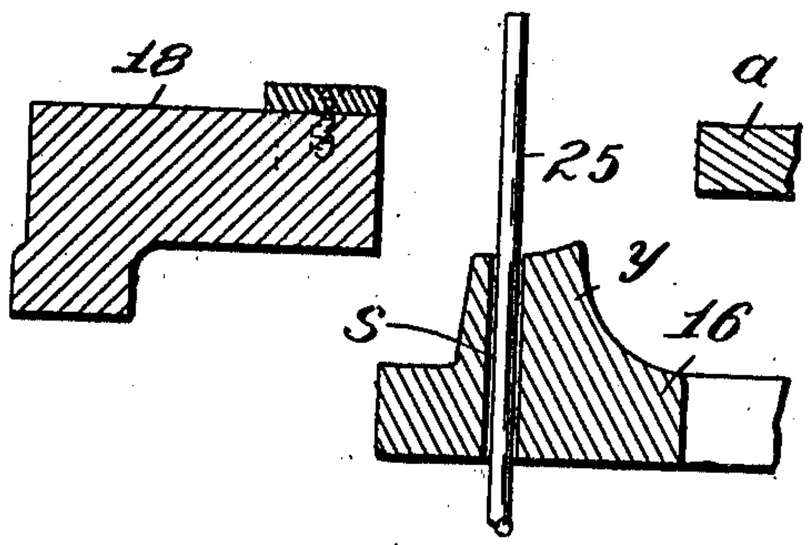
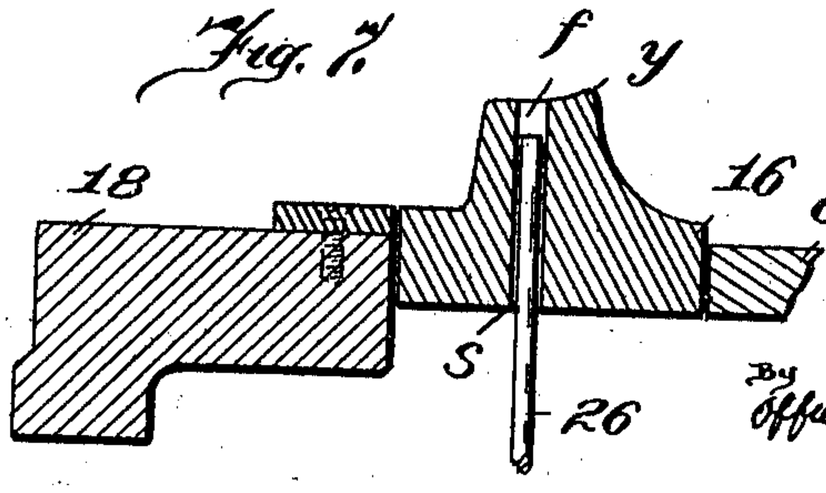


Fig. 7.



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UNITED STATES PATENT OFFICE.

ALBERT A. HUSEBY, OF CHICAGO, ILLINOIS.

PROCESS OF AND APPARATUS FOR CASTING PIANO-PLATES.

978,452. Specification of Letters Patent. **Patented Dec. 13, 1910.**

Application filed September 10, 1910. Serial No. 581,351.

To all whom it may concern:

Be it known that I, ALBERT A. HUSEBY, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of and Apparatus for Casting Piano-Plates, of which the following is a specification.

My invention relates to process of and apparatus for casting piano plates. Piano plates usually comprise a skeleton frame which supports the pins to which the strings are attached. Up to the present time the method of forming the plates with the pins has been to first cast the skeleton supporting frame, then drill this frame by hand and drive string supporting pins into the drill openings, or plates have been drilled and pins driven therein, and these plates then screwed or otherwise secured in proper place on the skeleton frame. This process of forming the plates and attaching the pins thereto is very costly on account of involving so much skilled labor in the drilling of the pin holes and the insertion of the pins in the holes.

One of the main objects of my invention is, therefore, to secure the pins in the skeleton frame simultaneously with the casting of such frame, and another important object of my invention is to provide improved casting apparatus for so applying the pins to the frame.

Another object is to provide improved mechanism for supporting the pins during the mold forming operation, the greater part of which mechanism can be drawn away from the mold after formation thereof, and parts of which mechanism remain in supporting contact with the pins to prevent any loosening or displacement of the pins during the withdrawal of such other part, the stationary pin supporting parts so engaging the pins that the finished mold therein can be readily withdrawn from its supporting frame without in any wise disturbing or loosening the pins held in the mold.

The invention also incorporates other features of procedure and construction, all of which coöperate to enable accurate positioning of the pins, so that they will form a rigid part of the mold into which a suitable metal is subsequently poured to receive and securely clamp the ends of the pins projecting from the mold. Therefore, instead of requiring a separate casting process, then a drilling process, and then insertion of pins in the drill openings, my invention enables me to combine the pins with the skeleton frame in one single casting operation.

My invention will be more clearly understood from the following specification and by reference to the accompanying drawings, in which drawings—

Figure 1 is a perspective view of casting apparatus, showing the patterns supported thereon and ready to receive the mold forming flask, Fig. 2 is a sectional view taken from plane 2—2, Fig. 1, Fig. 3 is an enlarged sectional view, showing more clearly the means for supporting a pin in the pattern preparatory to filling the flask above the pattern, Fig. 4 is a similar view, showing sand applied in the flask and tamped about the projecting end of the pin, Fig. 5 is a similar view but showing the pattern dropped away from the pin, Fig. 6 is a similar view, showing the flask with the pins therein raised clear of its supporting frame, and Fig. 7 is a view similar to Fig. 3, but with the flask and pin removed.

The main supporting frame 1 for the machine is of more or less skeleton form and comprises side members 2, to whose lower ends are pivoted supporting casters or wheels 3, a flange 4 extending inwardly from the side members just above the wheels to form a supporting shelf for a supporting plate 5. At its sides this plate 5 carries downwardly extending lugs 6 and 7 respectively for journaling shafts 8 and 9 respectively. Secured at an intermediate point adjacent each end of shaft 8 is a lever 10, and secured at an intermediate point adjacent each end of shaft 9 is a lever 11, the lower arms 10^a and 11^a of opposite levers being connected by a rod 12. The upper arms 10^b of the levers 10 each pivot the lower end of a link 13 whose upper ends pivot to the opposite sides of a pattern supporting platform 14, and likewise the upper arms 11^b of the levers 11 pivot the lower ends of links 15, whose upper ends pivot to opposite sides of the said platform 14 at the opposite end thereof. To one of the shafts, as for example shaft 8, an actuating lever 15′ is secured, either directly or by ratchet connection, by means of which the shaft can be rotated to rotate levers 10 and simultaneously the levers 11 through the connecting rods 12, the links and the upper arms of the levers forming a sort of toggle arrangement for raising and lowering the platform 14

upon rotation of the shafts upon swing of lever 15′. The platform 14 comprises the side walls or rim 14ª, to which the links are pivoted, and the top wall 14ᵇ secured to the rim and extending a distance inwardly therethrough to leave the central opening 14ᶜ. The pattern 16 is supported on and secured to the platform by means of raised blocks 17 and screws 17′. Secured to the top of the side walls 2 of the main frame is the top plate or frame 18 for coöperating with the pattern 16 to form the mold and to support the flask 19 into which the molding sand *s* is tamped, this flask having openings in its walls for receiving dowel pins 20 extending from the frame 18 and having also trunnions 21 for receiving suspension hooks, by means of which the flask can be raised from the machine after forming of the mold therein.

Referring particularly to Fig. 1 the pattern for the piano plate is as large as possible in skeleton form to insure lightness, ribs *r* and webs *w* being judiciously disposed to give the greatest strength and to most efficiently hold the pin supporting rails *x* and *y*.

Referring to Fig. 2, the top stripping plate 18 is marginal to leave the large central opening 22. Within this opening are permanently supported the various plates *a*, *b*, and so on, to produce openings in the casting corresponding to the various openings *a′*, *b′*, *c′*, and so on, between the ribs of the pattern. As shown in Fig. 2, plate *a* is supported on standard frame 23, and plate *b* is supported on standard frame 24 extending upwardly from plate 5, these standard frames extending through the corresponding openings *a′* and *b′* of the pattern mounted on the platform 14. The base of the casting being preferably uniplanar, the upper surfaces of the plates *a*, *b* and so on are in the plane of the upper surface of the top plate 18. As shown in Fig. 2, the pattern solid parts *x* and *y* are primarily in register below the various corresponding openings between the stationary plates *a*, *b* and so on, and between these plates and the top plate 18, so that when the pattern platform is raised these solid pattern parts will enter these openings and will extend a sufficient distance beyond the openings, depending upon the thickness of metal desired in the casing, the distances which these solid pattern parts extend beyond the plates *a*, *b* and so on, being illustrated by *d* in Fig. 1 and in the finished mold illustrated in Fig. 2.

Coming now to the more important feature of my invention, namely that of casting in the string supporting pins, I provide rows *o* and *p* of spindles 25 and 26 for supporting the pins to be cast in the pin supporting ridges *y* and *x* respectively, and the pattern parts *x* and *y* have rows of openings *q* and *s* through which the respective spindles extend, so that the pattern can be raised and lowered with reference to the stationary spindles. The method of procedure with reference to these pins is best illustrated in Figs. 3 to 7. In Fig. 7 the pattern 16 is shown in raised position ready for the molding operation, the length of the spindles being such that when the pattern is thus raised the upper ends of the pins will be a short distance below the upper ends of the respective openings *q* or *s* in the pattern parts *x* and *y* to leave pockets *f*. As shown in Fig. 3, a pin *g* is inserted in each of these pockets, and the flask 19 is then placed on its supporting plate 18 about the pattern. These pins have rounded bases *g′* and a groove g^2 below the head g^3 thereof. Sand is now tamped into the flask, and this sand entering the grooves g^2 will intimately surround the projecting ends of the pins and the heads thereof and will securely hold them. The flask has a number of ribs 19ª for localizing the sand, which ribs are cut away at 19ᵇ over the various projecting parts of the pattern, so that the mold is strengthened at these points, Fig. 4 showing the finished mold. As shown in Figs. 5 and 2, the toggle mechanism is now operated to lower the pattern away from the mold, the spindles *o* and *p*, however, still engaging with the bases of the pins to prevent loosening or displacement of the pins during withdrawal of the pattern. As illustrated in Fig. 6, the flask with the mold therein has been raised away from its supporting table 18, and such raising, by virtue of the rounded ends of the pins, was accomplished without in any way disturbing the pins and their rigid engagement in the mold. The flask with the mold is now inverted, and a cope, in which sand has been tamped and which has a flat surface, is now registered with and secured to the inverted flask with its flat surface closing the mold openings of the flask, and through suitable inlets the molten metal is then poured. This molten metal flows about and receives the ends of the pins projecting from the mold, and after cooling the pins will be rigidly held by the metal, the grooves g^2 of the pins then serving to receive and to secure the piano strings. Thus in one casting operation are the string supported pins set into the casting, which is a great improvement over prior procedures, in which the plate is separably cast, then drilled, and then the pins inserted. Considerable time and labor are thus eliminated, and the cost of the plates considerably reduced, while at the same time the pins are much more securely and rigidly held in place. Furthermore, in the old process accurate centering and spacing of the pins was not at all assured, and the pins, after being

driven into the drilled holes, were not always secured but would often loosen. In my improved process the pattern can be made with care and with absolute accuracy, so that the pin holes will be accurately spaced, and all the castings being made from the same pattern uniformity will be assured, and the pins being cast right into the metal will be securely held and will never loosen. In the prior art pins have been secured to objects by being cast therein, but in such cases the pins were stuck into holes extending only part way into the pattern, and during the process of tamping in the sand sand particles would find their way into these holes and the pins would become wedged, so that upon withdrawing of the mold the pins would remain in the pattern instead of following the mold. Furthermore, after each casting the holes had to be laboriously cleaned out to remove the sand particles. In my arrangement, in which the holes extend entirely through the pattern, and in which the spindles are rigid and extend through the holes as the pattern was lowered after a casting operation, the holes are automatically cleaned after each casting operation upon lowering of the pattern. Even if sand should fall into the holes during tamping the greater part of the sand will fall through the holes, and should any sand become wedged between the pins and the walls adjacent the holes, the pins cannot follow the pattern upon withdrawal thereof on account of being engaged by these stationary spindles, so that the pins will remain securely clamped in the mold after the pattern has been withdrawn.

As changes, both in procedure and apparatus, are possible, which would still come within the scope of my invention, I do not desire to be limited to the precise procedure and construction which I have outlined, and I desire to secure the following claims.

I claim—

1. The process of producing molds for the casting of metallic piano plates with string supporting pins, which consists in associating a pattern for the plate with a molding flask, applying pins to the pattern at desired places to be partly supported by the pattern, providing other means for assisting the pattern in supporting the pins, then tamping sand into the flask about the pattern and the pins projecting therefrom, then withdrawing the pattern independently of such other pin supporting means, and then removing the mold from said other pin supporting means.

2. The process of producing molds for the casting of metallic piano plates having string supporting pins, which consists in associating a mold flask with a pattern for the plate, loosely applying pins to the pattern at desired places to be held against lateral displacement by said pattern, providing other supporting means independent of said pattern for supporting said pins to project a distance beyond said pattern, then tamping molding sand into the flask about said pattern and about the projecting ends of the pins, then withdrawing the pattern from the mold but leaving the other supporting members in position to prevent displacement of the pins upon withdrawal of the pattern, and then removing the mold from said other supporting members.

3. In molding apparatus, the combination of a molding flask supporting table, a pattern supporting platform movable toward and away from said table, a pattern on said platform, said pattern having rows of openings corresponding to the positions in which string supporting pins are to appear in the finished casting, stationary spindles received by said openings upon movement of said platform, the outer ends of said spindles being a distance within the outer faces of the pattern when said pattern is in molding position whereby to leave pockets, pins inserted in said pockets to be held against lateral displacement by the surrounding walls of the pattern, said spindles holding said pins against longitudinal displacement and to project a distance beyond said pattern, a molding flask on said table into which sand is to be tamped about said pattern and the pins projecting therefrom, said pattern upon withdrawal from the mold being moved from the pins, and said spindles still engaging said pins to prevent longitudinal displacement thereof during such withdrawal of the pattern.

4. In molding apparatus, the combination of a supporting frame having a top for receiving a molding flask, a pattern supporting platform below said top, a pattern mounted on said platform, means whereby said platform may be raised and lowered to carry said platform upwardly into molding position with reference to said top or downwardly to carry the pattern away from said top, spindles rigidly supported from said table and extending upwardly beyond said top, said pattern having passageways for slidably receiving said spindles, the upper ends of said spindles being a distance below the upper ends of the corresponding passageways through the pattern when the pattern is in molding position whereby to form pockets, a string supporting pin loosely inserted in each pocket to be supported against lateral displacement by the adjacent walls of the pattern and to be projected a distance beyond the surface of the pattern by the corresponding spindle and to be held against longitudinal displacement by the spindle, a molding flask on said supporting frame top into which sand may be tamped about the pattern and the pins projecting there-

from, the projecting ends of the pins being notched to be more securely engaged and clamped by the molding sand, lowering of the pattern from the mold causing disengagement thereof from the pins, but said spindles remaining to prevent longitudinal displacement of the pins during such lowering of the pattern, the lower ends of the pins being rounded, whereby the flask with the molding sand and pins clamped thereby may be removed from the supporting frame top without causing displacement of the pins by the spindles.

5. The process of forming a mold for casting pins in cast products, which consists in supporting the pins against longitudinal displacement during tamping of sand in the mold about the pins, and maintaining such longitudinal support during withdrawal of the pattern from the mold.

6. The process of forming a mold for casting pins in cast products, which consists in supporting the pins against lateral displacement by the pattern during tamping of the sand about the pattern, supporting said pins against longitudinal displacement independently of the pattern, and maintaining such longitudinal support of the pins during removal of the pattern from the mold to thereby prevent loosening or withdrawal of the pins from the mold upon removal of such pattern.

In witness whereof, I hereunto subscribe my name this 8th day of September, A. D., 1910.

ALBERT A. HUSEBY.

Witnesses:
EMILIE ROSE,
NELLY B. DEARBORN.