A. G. GRUSS AND P. GEYER.

CASTING PROCESS.

APPLICATION FILED NOV. 29, 1919.

1,341,461. Patented May 25, 1920.

Fig. 1,

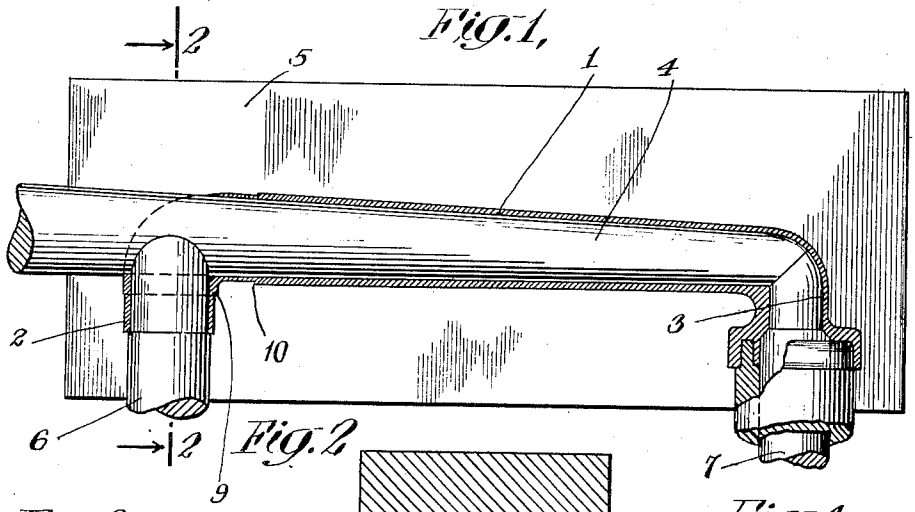



Fig. 2

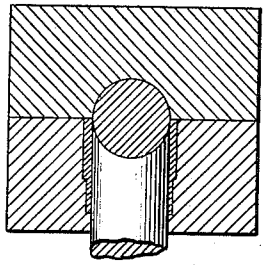


Fig. 3,

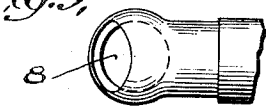



Fig. 4,

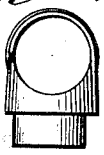


Fig. 5,

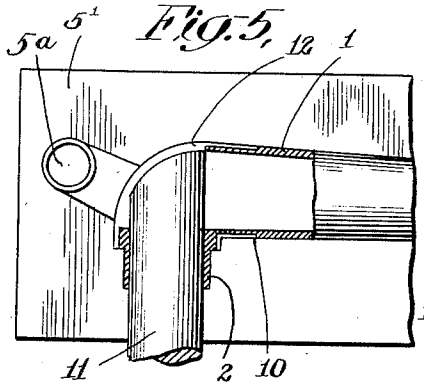



Fig. 6,

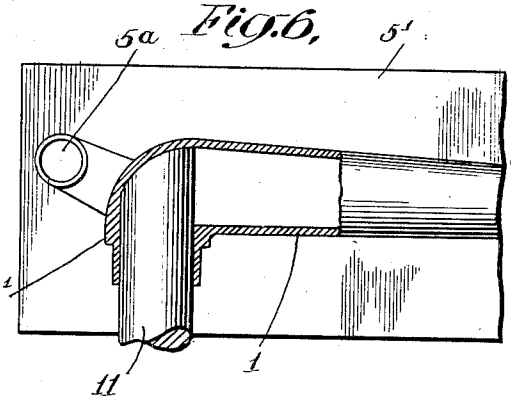
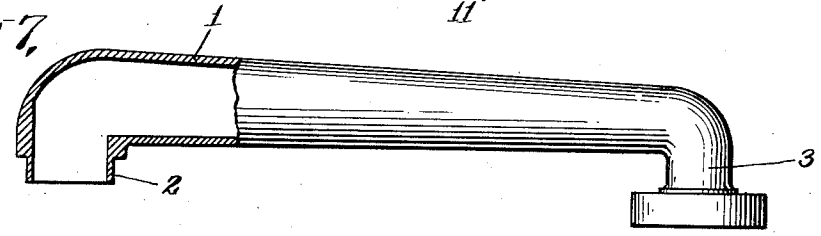



Fig. 7,




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By their Attorney

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# UNITED STATES PATENT OFFICE.

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## CASTING PROCESS.

1,341,461. Specification of Letters Patent. Patented May 25, 1920.

Application filed November 29, 1919. Serial No. 341,547.

*To all whom it may concern:*

Be it known that we, ALBERT G. GRUSS and PHILIP GEYER, both citizens of the United States, residing at borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Casting Processes, of which the following is a specification.

Our invention relates to processes involved in casting tubular objects which have bent or offset or curved portions, such that it would be impossible to cast the same about cores, by the usual methods, and then withdraw the cores. For example, in the case of a hollow tube having its end portions bent at right angles to its main body portion it would manifestly be impossible to cast or mold the same as an integral construction, about three cores, and then withdraw all of the cores in the usual manner because there would be no way of getting out the core of the main body portion.

Our invention is in some respects an improvement upon that disclosed in Patent No. 1,302,958, issued May 6, 1919, to Charles Pack. In the process disclosed in said patent, the core which by the usual practice could not be removed, is allowed to extend out through the die or mold, and thus form an opening in what would be one of the finished walls of the object being cast. When the casting has been poured, the cores are withdrawn and the edges of the opening referred to are coated with a solder, after which the object is again placed in a suitable die and a core inserted in the adjacent end portion, so as to cover the opening referred to. Metal is then poured into the die and against the core, so as to fill up the opening and make an integral structure with the original casting.

The object of our invention is to effect the closure of the opening through which the core referred to was withdrawn in a more effective and improved manner. In place of casting the molten metal, in the last step of the Pack process referred to, to merely fill the opening and to form a joint with the edge thereof, we so arrange the first die or mold used that the wall adjacent to or surrounding the opening through which the extended core is withdrawn will be less than its final thickness, a shoulder or abutment being thereby formed. When now the closure for the opening through which the extended core was withdrawn is to be cast, the die or mold in which this final operation takes place is so arranged that the molten metal which is poured therein will not only flow against the core which is positioned to close the opening but will also cover the adjacent portion of the wall of the object, which is of reduced thickness. In this operation the metal flows against the shoulder or abutment referred to and brings the whole portion of reduced thickness up to its final thickness, and makes an integral structure with the original casting, having no perceptible joint. The closure is by this method more securely anchored in position, and in many cases the necessity of employing solder in effecting the joint will be eliminated.

In order that our invention may be more clearly understood attention is hereby directed to the accompanying drawings, forming part of this application, and illustrating one manner in which our invention may be carried out. In the drawings, Figure 1 is a plan view of a die showing what may be termed a tone arm in process of formation therein, in cross section, with three core pins in position; Fig. 2 is a cross section taken on the line 2—2 of Fig. 1; Fig. 3 is a partial plan view of the tone arm shown in Fig. 1; Fig. 4 is an end view of the same; Fig. 5 is a partial plan view similar to Fig. 1, showing a further step in the process, the tubular object having been placed in a different die; Fig. 6 is a view similar to that shown in Fig. 5, showing a further step in the process; and Fig. 7 is a front elevation partly in cross section, of the completed object formed in the preceding figures.

Referring to the drawings, we have indicated the casting of a hollow tubular arm having a main tapering horizontal portion 1, with a pair of end portions 2 and 3 which are offset at right angles from the portion 1. A core 4 is used to form the main portion 1 of the tubular object to be cast, this core extending out of the die 5 to the left. Straight cores 6 and 7 are used to form the end portions 2 and 3 of the object, in the usual manner. The cores being properly positioned in the mold cavities of the die, the metal is poured, with the result that

an integral tubular object is formed about the three cores, in which there is a hole or opening 8 formed at the end of the portion 1 of the object above the end portion 2 thereof, through which hole the core 4 extends.

The mold cavity in the die is so arranged that a portion of the casting adjacent to the opening 8 will be of less than its intended final thickness. As is shown in the drawings this portion of reduced thickness may extend from the shoulder 9 formed on the offset portion 2 of the casting to a peripheral line extending around the main portion 1 of the casting as is indicated at 10. A shoulder or abutment will be formed about the casting, as is indicated at 10, because of the fact that the tubular portion 1 of the casting is of normal thickness to the right of this line and is of reduced thickness to the left of this line.

The metal having been poured as described, the cores are withdrawn, the core 4 being withdrawn through the opening 8. The object is now placed in another die 5′ with another core 11 inserted in the end portion 2 of the casting. This core 11 has its inner end suitably formed to press against the surface of the casting in which the opening 8 appears. The die 5′ being suitably gated, as is shown at $5^a$, molten metal is poured therein against the end of the core 11 for a sufficient extent to fill the opening 8. The mold cavity in the die 5′ is so constructed that the molten metal, in covering the end of the core pin 11, will also flow over the outer surface of the portions of the casting of reduced thickness adjacent the opening 8. In Fig. 5 of the drawings the mold cavity which is thus filled with the molten metal is indicated at 12.

In some cases it may be deemed desirable to give the edges of the opening 8 and the outer surface of the portion of reduced thickness of the casting adjacent the opening 8, a light coating of molten solder or a tinning mixture before the molten metal is poured through the gate $5^a$. Whether or not this is done the molten metal will flow against the shoulder 10, bringing the portion of reduced thickness of the wall of the casting up to its final thickness and forming a substantially integral structure when the casting is made. The closure for the opening 8 will then have an integral extension or extensions located upon the adjacent portions of the casting the closure being firmly bound in position because of its engagement with the edges of the opening 8, with the surface of the portion of the casting of reduced thickness, and with the shoulder 10.

In Fig. 6 we have illustrated the complete casting after the closure portion referred to has been poured. this closure portion and integral extension being indicated in the drawings at 12′. When the metal has sufficiently solidified the core pin 11 is withdrawn, and it will be found that an integral construction is presented in which no joint is apparent after a slight polishing or finishing of the article. The complete article as formed is illustrated in Fig. 7.

It will be understood that our invention is not limited strictly to the exact details illustrated and specifically described but that the same is as broad as is indicated by the accompanying claims.

What we claim is:

1. A method of casting a tubular object, consisting in casting such an object complete except that an opening through a wall of the object is left and that the wall portion adjacent the opening is less than its final thickness, and then casting a closure for said opening in such manner that the metal thereof will cover the wall portion of reduced thickness to complete the structure of the object.

2. A method of casting a tubular object, consisting in casting such an object about one or more cores, one of which extends through what will be a closed surface of the finished object, in such manner that the wall portion adjacent the opening through which said extended core extends will be of less than its final thickness, drawing the core or cores, and then casting a closure for the opening left by the withdrawal of said extended core in such manner that the metal thereof will cover said wall portion of reduced thickness to complete the structure of the object.

3. A method of casting a tubular object, consisting in casting such object about one or more cores, one of which extends through what will be a closed surface of the finished object, in such a manner that the wall portion adjacent the opening through which said extended core extends will be of less than its final thickness, drawing the core or cores, placing the object in a suitable die, inserting a core in the object to cover the ing through which said extended core was withdrawn, pouring molten metal within said die and against said core to close said opening and cover said wall portion of reduced thickness, and withdrawing said last named core.

4. A method of casting a tubular object, consisting in casting such an object about one or more cores, one of which extends through what will be a closed surface of the finished object, in such a manner that the wall portion surrounding the opening through which said extended core extends will be of less than its final thickness and an abutment will be provided thereon, drawing the core or cores, and then casting a closure for the opening left by the withdrawal of

said extended core in such manner that the metal thereof will abut against said abutment and cover said wall portion of reduced thickness, to complete the structure of the object.

5. A method of casting a tubular object having bent or curved portions, consisting in so locating a plurality of cores in a die, in an angular relation, as to form a desired section, with an elongated one of the same extending through what will be a closed surface of the desired object, pouring molten metal around said cores in the die, to form the complete object except for the opening through which said elongated core extends and except that a portion of the wall of the object surrounding said opening is left of reduced thickness, drawing the cores, inserting another core into the object to cover said opening, placing the object in a suitable die, and pouring molten metal within said die and against said core to close said opening and cover said wall portion of reduced thickness, and withdrawing said last named core.

This specification signed and witnessed this 26th day of November, 1919.

ALBERT G. GRUSS.
PHILIP GEYER.

Witnesses:
WILLIAM R. ALESBERG,
WILLIAM E. BAUERSCHMIDT.