T. E. MURRAY.

METHOD OF MAKING CRANK SHAFTS.

APPLICATION FILED DEC. 14, 1916.

1,220,771. Patented Mar. 27, 1917.

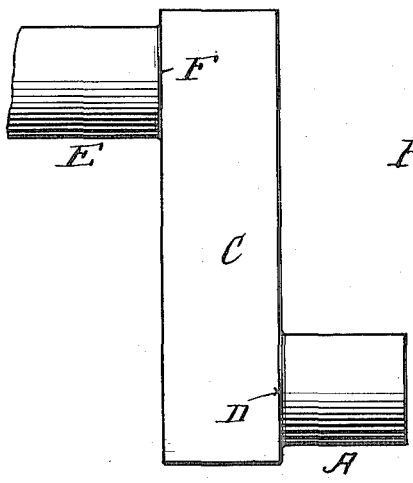

Fig. 1.

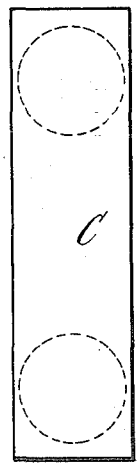

Fig 2.

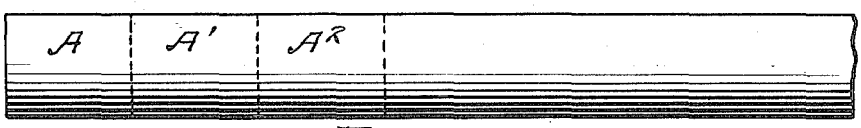

Fig. 3.

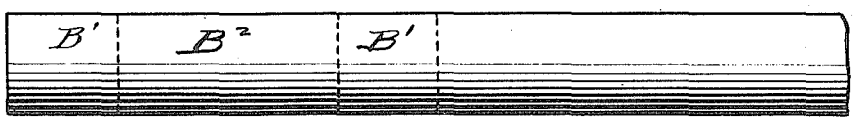

Fig. 4

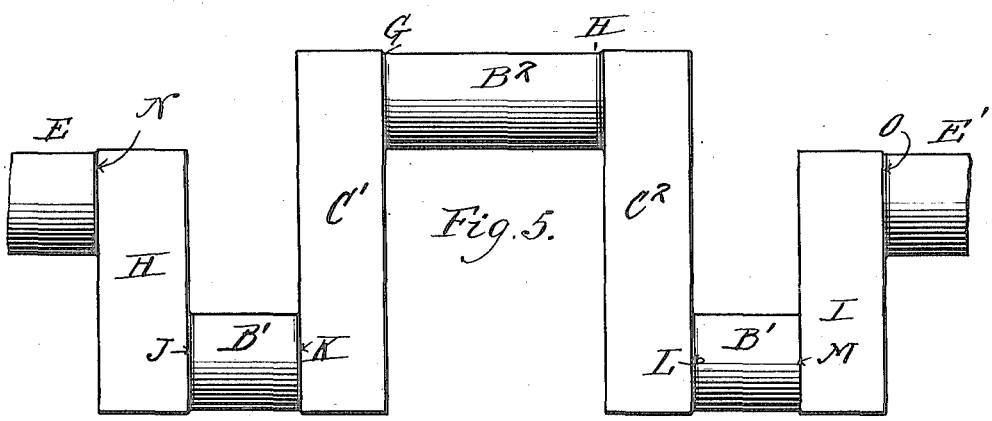

Fig. 5.

Inventor

Thomas E. Murray

By his Attorney

Zach Benjamin

UNITED STATES PATENT OFFICE.

THOMAS E. MURRAY, OF NEW YORK, N. Y.

METHOD OF MAKING CRANK-SHAFTS.

1,220,771. Specification of Letters Patent. Patented Mar. 27, 1917.

Application filed December 14, 1916. Serial No. 136,860.

To all whom it may concern:

Be it known that I, THOMAS E. MURRAY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Methods of Making Crank-Shafts, of which the following is a specification.

In the present method of forming a crank shaft, the material is drop-forged to the desired shape. In order to enable it to withstand the strains produced in drop-forging, said material must be made up of certain ingredients, which renders it expensive.

After the crank shaft is shaped, it must be turned down and ground, and polished with emery cloth at each of the bearing surfaces. The bearing surfaces are on different centers, and this requires careful alinement on the lathes for each operation. For example: The crank shaft of a four-cylinder, four-cycle gasolene engine has its crank pins and bearings on three different centers. This must be lined up and turned on lathes in three different positions. Then follow adjustments on three other lathes for grinding, and alinement on three additional lathes for final polish.

In addition, material suitable for crank pins and the material suitable for crank arms are different, because these parts perform different functions. Crank pins essentially require hard material. Crank arms essentially require tough material. These requirements are not fulfilled by drop-forgings, wherein, of course, the material throughout is the same.

I have devised a method of making crank shafts whereby the cost and labor of production are greatly reduced, ample strength secured, and the requirements of hardness of material in the pins and toughness of material in the crank arms are satisfied in a single structure.

In the accompanying drawings—

Figure 1 shows my crank shaft in side elevation. Fig. 2 is a face view of the crank arm C. Fig. 3 shows the mode of cutting crank pins of equal length, and Fig. 4 the mode of cutting crank pins of unequal length from a turned rod. Fig. 5 is an elevation of my multiple crank shaft.

Similar letters of reference indicate like parts.

I carry my method into practical effect in the following way:

The shaft E is made separately from the crank arms and pin, and in any suitable way. Having selected a material of suitable hardness (preferably harder than the shaft K) for crank pins, I form a crank pin A, Fig. 1, by turning said material in the lathe. When it is desired to produce a number of crank pins all alike, I may turn a rod B, Fig. 3, of suitable length and cut therefrom the desired number of pins A, A′, A^2, etc., as indicated by dotted lines. Where a multiple crank shaft, as shown in Fig. 5, is to be made, then I may cut from said rod pins of different lengths, as B′, B′ and B^2.

Having selected material of suitable toughness for crank arms, Figs. 1 and 2, I separately form said arms therefrom preferably by drop-forging, stamping or the like.

In the case of a single crank, Fig. 1, I unite the pin A to crank arm C by an electrically welded joint D, and the crank arm C to the end of shaft E by an electrically welded joint F.

In the case of a multiple crank shaft, Fig. 5, I unite the ends of pin B^2 to the crank arms C′, C^2 by electrically welded joints G, H. I unite the ends of pins B′, B′ respectively to crank arm C′ and crank arm H and crank arm C^2 and crank arm I by electrically welded joints at J, K, L, M, I unite the ends of shafts E, E′ to crank arms H, I by electrically welded joints at N, O.

It will be obvious that there is no lathework done in making my crank shaft, other than the turning of rod A from which the crank pin is made or the crank pins are cut. The crank-arms C being simply drop-forged are, of course, all alike. If the crank is multiple, as in Fig. 5, then, of course, the arms C′, C^2 are all alike, and the arms I, J are all alike. The making of the electrically welded joints, which can now be done with certainty, completes the entire operation, no machining and necessarily no further manipulation of any kind being required to render the crank shaft ready for immediate use. And, finally, the parts in a plurality of crank shafts are all interchangeable.

I claim:

1. The method of making a crank shaft, which consists in turning a cylindrical crank

pin, producing a crank arm from a body of material separate from the pin and the shaft, and uniting said arm to the shaft and to said pins by electrically welded joints.

2. The method of making a multiple crank shaft, which consists in turning a cylindrical rod and dividing the same into a plurality of crank pins, some of said pins being of a given length and the remainder of a given less length, producing a plurality of similar crank arms from material separate from that of said pins, producing a plurality of similar crank arms of greater length than said first-named crank arms from material separate from that of said pins, and uniting a selected number of arms and pins to each shaft by electrically welded joints to form a multiple crank on said shaft.

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

THOMAS E. MURRAY.

Witnesses:

GERTRUDE T. PORTER,

MAY T. MCGARRY.