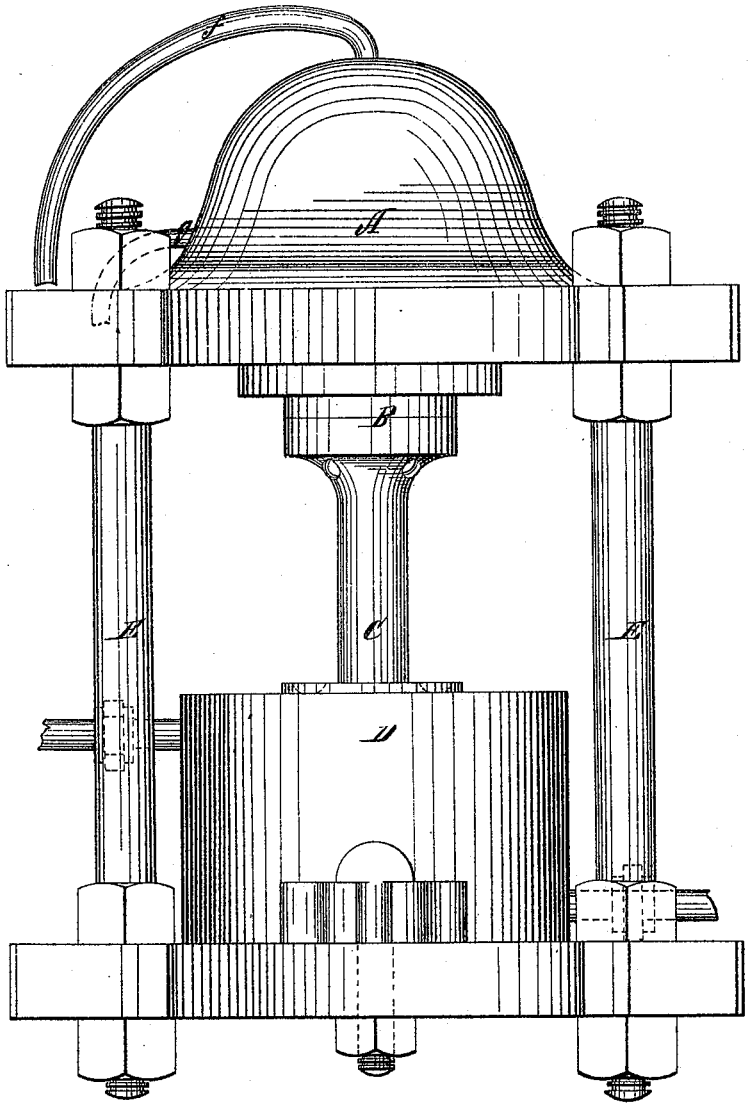
2 Sheets. Sheet 1.

L. & R. Crooke,

Shaping Solder.

No. 54,120. Patented Apr. 24, 1866.

Fig: 1.



Witnesses:

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W. L. Bennem

Inventor:

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by their attorney
O. P. Penwick.

2 Sheets, Sheet 2.

L. & R. Crooke,

Shaping Solder.

No. 54,120. Patented Apr. 24, 1866.

Fig. 2.

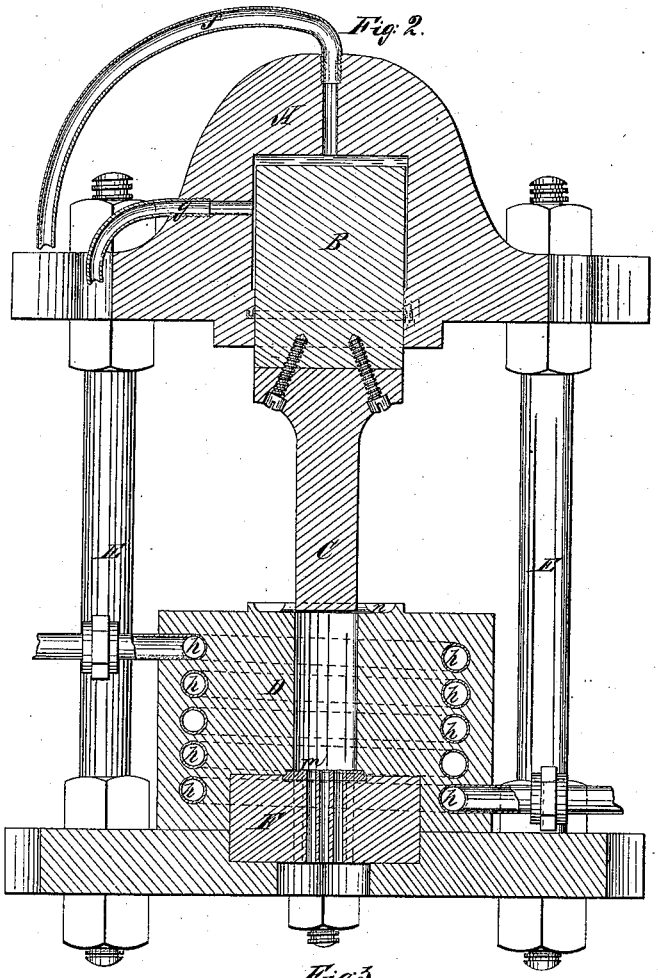
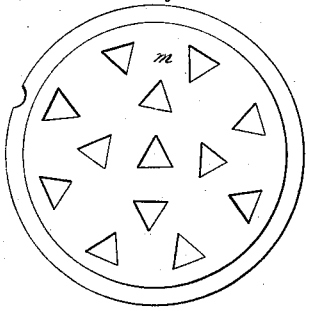


Fig. 3.



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UNITED STATES PATENT OFFICE.

LEWIS CROOKE AND ROBERT CROOKE, OF NEW YORK, N. Y.

IMPROVED COMPRESSED ROD-SOLDER.

Specification forming part of Letters Patent No. 54,120, dated April 24, 1866.

To all whom it may concern:

Be it known that we, LEWIS CROOKE and ROBERT CROOKE, of the city, county, and State of New York, have invented a new and useful manufacture, which we denominate "Compressed Rod-Solder;" and we do hereby declare that the following is a full, clear, and exact description of the same and of the mode of producing it.

Our invention consists of tin and lead combined by melting them together, and by expressing the alloy in a congealed state, by great pressure, through a die or orifice, so that the product has the form of a rod, the particles of which have been intimately blended by fusion, and by great pressure, in a congealed state, subsequent to fusion.

In producing our new manufacture we prefer to use two parts, by weight, of lead, and one part, by weight, of tin; but these relative quantities may be varied according to the judgment of the manufacturer. If the lead and tin are in the bar form, we melt the lead first and then stir in the tin. If the metals have previously been rolled together, we melt the rolled compound directly. The melted alloy is poured into a strong cylinder fitted with a piston or plunger and with a die perforated with numerous holes of the size and form of the cross-section of the compressed rod-solder to be produced. The fused alloy is permitted to congeal or set, and then pressure is applied to the plunger to force the alloy through the perforations of the die, from which it issues in compressed rods.

The machine we have devised for effecting the expression of the alloy in the form of rods is represented in the accompanying drawings, Figure 1 representing an elevation of the machine; Fig. 2, a vertical section through its center, and Fig. 3 a plan of a die of full size.

The hydraulic cylinder A is constructed of cast-iron, which may be lined with sheet-copper if found expedient, and it is fitted with a ram, B, which is packed in the usual manner practiced with the rams of hydraulic presses. This ram is connected with a plunger or piston, C, which fits into a cylinder, D, in which the solder is placed.

The solder-cylinder D and the hydraulic cylinder A are connected by wrought-iron standards E of sufficient size to resist the greatest strain required in the operation of the machine.

The perforated die *m* is fitted to the bottom of the solder-cylinder, and is perforated with numerous holes, each of the size and form of a transverse section of the rod of solder to be made, and the form of hole which is preferred is a triangle, as represented at Fig. 3. The perforations must be numerous, as represented, there being one of a sectional area of about six one-hundredths of a square inch for about each eighty-five one-hundredths of a square inch of the area of the piston of the solder-cylinder, because the rods must be of small cross-section to suit the trade, and the perforations must accord therewith; and solder is so hard and unyielding a material that a number of such perforations are required to permit the solder to escape with the requisite freedom from the solder-cylinder, to permit the movement of a piston of a reasonable size for practical use without breakage from excessive pressure.

The die is supported upon a base-block, F, which is perforated with as many holes as there are holes in the die, but of slightly larger size, so as to permit the free passage of the rod-solder from the die.

The head of the solder-cylinder has a shallow groove, *n*, formed upon it, with an opening into the cavity of the cylinder, so that the melted solder can be readily poured into the said cavity.

The hydraulic cylinder is fitted with a supply-pipe, *f*, leading from a force-pump of the usual construction of pumps for hydraulic presses. It is also fitted with an escape-pipe, *g*, to permit the escape of water after an operation is completed. Melted solder of the usual composition—say two parts lead and one part tin—is poured into the solder-cylinder and permitted to cool. As soon as it sets the force-pump is put into operation, and the solder is expressed in the form of a number of rods simultaneously from the die.

In order that the solder may be made to set rapidly, so that the machine may be used to make a number of operations in rapid succession, the solder-cylinder D has a coil of pipe, *h*, cast in it, and a current of water is caused

to flow through this coil, so as to abstract the heat rapidly.

The pressure required is very great, a solder-cylinder three and a half inches in diameter, fitted with the die represented at Fig. 3, having thirteen triangular perforations, each with sides three-eighths of an inch broad, requiring a pressure of about three hundred tons upon its piston to do the work.

The compressed rod-solder thus produced can be furnished of any desired cross-section by making the orifices of the die of corresponding form. It is a better article than the old bar-solder produced by casting the alloy of lead and tin into molds, melting at a lower temperature, and flowing more readily on the work to which it is applied; and these qualities appear to be due to the intimate blending of the particles of the material by the conjoined action of the fusion and the great pressure to which it is subjected by expression through the orifices of the die. The manufacture can also be produced at a less cost than cast bar-solder can, because less labor is required and because the waste from oxidation is less, as the fused alloy is exposed for a less period to the action of the air, and is not agitated by ladling it out in small quantities to pour it into the molds. Moreover the article can be produced in forms which cannot be produced by casting, or can be produced only by the use of very costly molds.

We do not claim in this patent the invention of the solder-machine we have described, as we regard that as a distinct invention; but

We claim as the invention to be secured by Letters Patent to which this specification is annexed—

The compressed rod-solder hereinbefore described, consisting of lead and tin combined by fusion and subsequent expression through a die, the same being a new manufacture.

In testimony whereof we have hereunto set our hands this 23d day of October, A. D. 1865.

LEWIS CROOKE.
ROBERT CROOKE.

Witnesses:
GEORGE H. CAREY,
WM. JS. EGINTON.