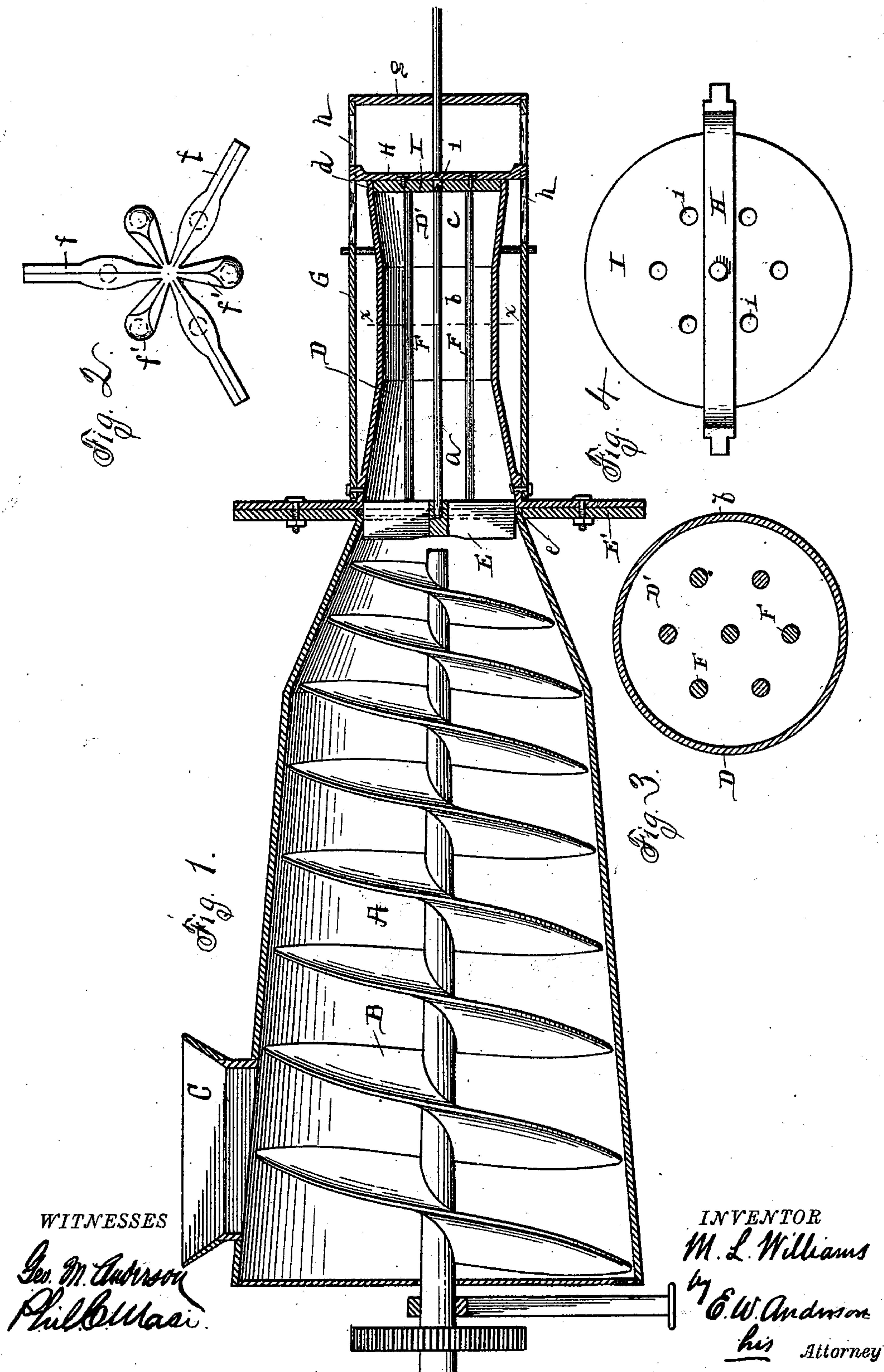


(No Model.)

M. L. WILLIAMS.
MACHINE FOR FORMING TUYERES AND PIPES.

No. 518,169.

Patented Apr. 10, 1894.



UNITED STATES PATENT OFFICE.

MORGAN L. WILLIAMS, OF JOHNSTOWN, PENNSYLVANIA.

MACHINE FOR FORMING TUYERES AND PIPES.

SPECIFICATION forming part of Letters Patent No. 518,169, dated April 10, 1894.

Application filed November 21, 1893. Serial No. 491,567. (No model.)

To all whom it may concern:

Be it known that I, MORGAN L. WILLIAMS, a citizen of the United States, and a resident of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Forming Tuyeres and Pipes; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a vertical central section of the invention. Fig. 2 is a detail view of the arms and lugs of the spider. Fig. 3 is a horizontal sectional view of die case taken on line *x x*, Fig. 1 and Fig. 4 is a detail view of the compressor plate and cross head.

This invention has relation to certain new and useful improvements in machines for the manufacture of tuyeres and pipes, and is designed to provide a machine of this character by the operation of which a tuyere or pipe may be made complete in one operation, and in a much better, and more rapid and practical manner than has heretofore been possible.

In the manufacture of tuyeres, as heretofore practiced, it has been a matter of considerable difficulty to form the article complete in one operation, with its perforations and bell, with any considerable degree of rapidity, and without producing breaks or flaws destructive to its life. These objections are in a large measure overcome by the present invention.

With these objects in view the invention consists in the novel construction and combination of parts all as hereinafter described and pointed out in the appended claims.

Referring to the accompanying drawings the letter A designates the clay cylinder or casing which has the form of an elongated, truncated cone, tapering from the receiving to the discharge end. Working in said cylinder or casing is a spiral conveyer B, the flanges of which progressively reduce in diameter to correspond to the reducing form of the said cylinder or casing.

C is the clay feed opening or hopper near

the larger end of the said casing. The smaller end of the casing is open and has secured thereto a die-case D, having therein a die-chamber D' which forms a continuation of the chamber of the casing. Said die-chamber is made with a flaring portion *a* at its receiving end, and intermediate straight-walled portion *b* which gives the body of the tuyere its form, a flaring portion *c* near its discharge end in which is formed the bell of the tuyere, and a short straight-walled portion *d* at the discharge end which forms the seat for a check-plate or compressor presently to be described. The entire length of the die-case is considerably less than the usual length of the tuyere to be formed.

E designates a spider, the rim or ring of which is let into a rabbet *e* in a plate E' on the discharge end of the clay cylinder or casing. Said spider forms the support for a series of perforating, or core, rods F, whose outer ends terminate at about the point where the outer straight portion *d* of the die-chamber commences. A number of said rods are supported in the arms *f* of the spider, while the rest are supported in lugs *f'* of said spider. Both said arms and the lugs are beveled so as to offer but little resistance to the passage of the clay into the die-chamber. In the drawings I have shown seven of these rods, but it will be understood that the number used will depend upon the number of perforations or passages to be made in the tuyere.

G designates a yoke, the arms of which are pivoted to the exterior of the die-case near its base, their forward end portions extending beyond the die-case and connected by a cross-bar *g*. Formed in or upon the arms of said yoke, near their forward ends, are guide-ways or slots *h*, in which works a cross-head H. Secured to said cross-head is a check or compressor plate I, of such diameter as to fit closely but movably in the portion *d* of the die-chamber. Formed through said plate are a series of holes or perforations *i* corresponding in number and position to the rods F, whose end portions they receive when the plate is seated in the portion *d*.

The operation is as follows:—The clay, fed into the cylinder, or casing A, is forced along by the revolution of the conveyer, becoming gradually compressed, until it is discharged

into the die-chamber under great pressure. When said chamber becomes filled, the conveyer is stopped, and the check plate is forced into its seat, that portion of the clay which is in the portion *d* being compressed into the portion *c* to form the bell. The check plate is then withdrawn, the yoke swung back on its pivots, and the conveyer again started, when the pressure from behind forces the molded clay along until the desired length projects from the die-case and is cut off. The conveyer is again stopped, and the check plate again operated as before to form the bell on the second article.

It will be observed that the clay may be fed continuously into the conveyer, thus obviating the necessity for stopping operations to re-charge the clay cylinder, as is necessary in the old forms of piston charging machines. The only stoppage necessary is that required to operate the check plate, so that I am enabled to turn out a great many more articles in the same length of time than is possible with the old machines.

The neck portion *b* of the die-chamber, or that portion which gives form to the body of the tuyere, is usually made from four to seven inches in length. In certain machines heretofore in use this neck portion has consisted merely of a ring but an inch or so in breadth, and with such machines it has been impossible to form a satisfactory article for the reason that the clay in passing through such a short ring is not properly shaped, and has a tendency to curl back as a result of the oblique pressure from the converging sides of the clay chamber. In other machines the die-chamber has been made the full length of the article to be formed but this is objectionable owing to the enormous pressure required to force the molded clay through, whereby the latter becomes heated, and cannot be worked. Both these objections are avoided by forming the neck from one-seventh to one-fourth the length of the article to be formed. I am also enabled by such construction to use a much stiffer clay than is possible with a long die, so that the tuyere comes out more solid and does not require such careful handling. By forming the tuyere around the rods *F*, instead of forcing perforating rods through the tuyere blank, as in some processes, a much more satisfactory article is produced, for the reason that in forcing the perforators through the blank, cracks are often formed, which, though hidden, destroy the life of the tuyere. This is not possible where the clay is packed around the perforators under the pressure of the conveyer. It will further be seen that the bell is formed by compression applied at that point, instead of through the die-case from the charger, and the same means may be conveniently employed for forming the flaring mouths of sewer or conduit pipes.

A bar, lever, toggle-joint, or other suitable

mechanism may be employed for actuating the check-plate.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for forming tuyeres and pipes, the combination of an elongated, tapering clay cylinder or casing a spiral conveyer or screw rotatable therein, a die case secured to the discharge end of said cylinder or casing, said die case having an elongated, straight, forming portion *b*, and a flaring bell-forming portion *c*, a series of perforator rods supported within said die case, and a compressing check plate arranged to be forced into the discharge end portion of said die case, and compress the clay into the bell, substantially as specified.

2. In a machine for forming tuyeres and pipes, the combination of a clay casing, a spiral conveyer working therein, a die case connected to the discharge end of said clay casing, said die case having a straight forming portion of a length from one fourth to one seventh of the article to be formed, and a flaring bell-forming portion *c*, a series of perforator rods supported in said die case, and a reciprocating compressing check plate adapted to be forced into a straight-walled portion in the discharge end of said die case, substantially as specified.

3. The combination with the die-case, and the die-chamber therein having the flaring portion *c* and the straight portion *d*, of a check plate adapted to enter said straight portion, and a swinging yoke or frame carrying said check-plate, substantially as specified.

4. The combination with the die-chamber having the body-shaping portion *b* of a length from one-fourth to one-seventh of that of the article formed thereby, the bell-forming portion *c*, and the straight portion *d*, of a reciprocating check-plate or compressor arranged to seat in the said portion *d*, and a swinging yoke or frame carrying said check-plate, substantially as specified.

5. The herein described machine for the formation of tuyeres, said machine comprising a clay cylinder or case, a spiral conveyer, or screw therein, a die-case secured to the discharge end portion of said cylinder or casing, a die-chamber in said die-case having the portions *c* and *d*, the spider, the perforator rods supported in said chamber by said spider, the yoke pivoted to said die-case, the cross-head working in said yoke, and the perforated check-plate or compressor carried by said cross-head, and arranged to seat in the said portion *d*, substantially as specified.

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

MORGAN L. WILLIAMS.

Witnesses:

GEORGE H. PARMELEE,
PHILIP C. MASI.