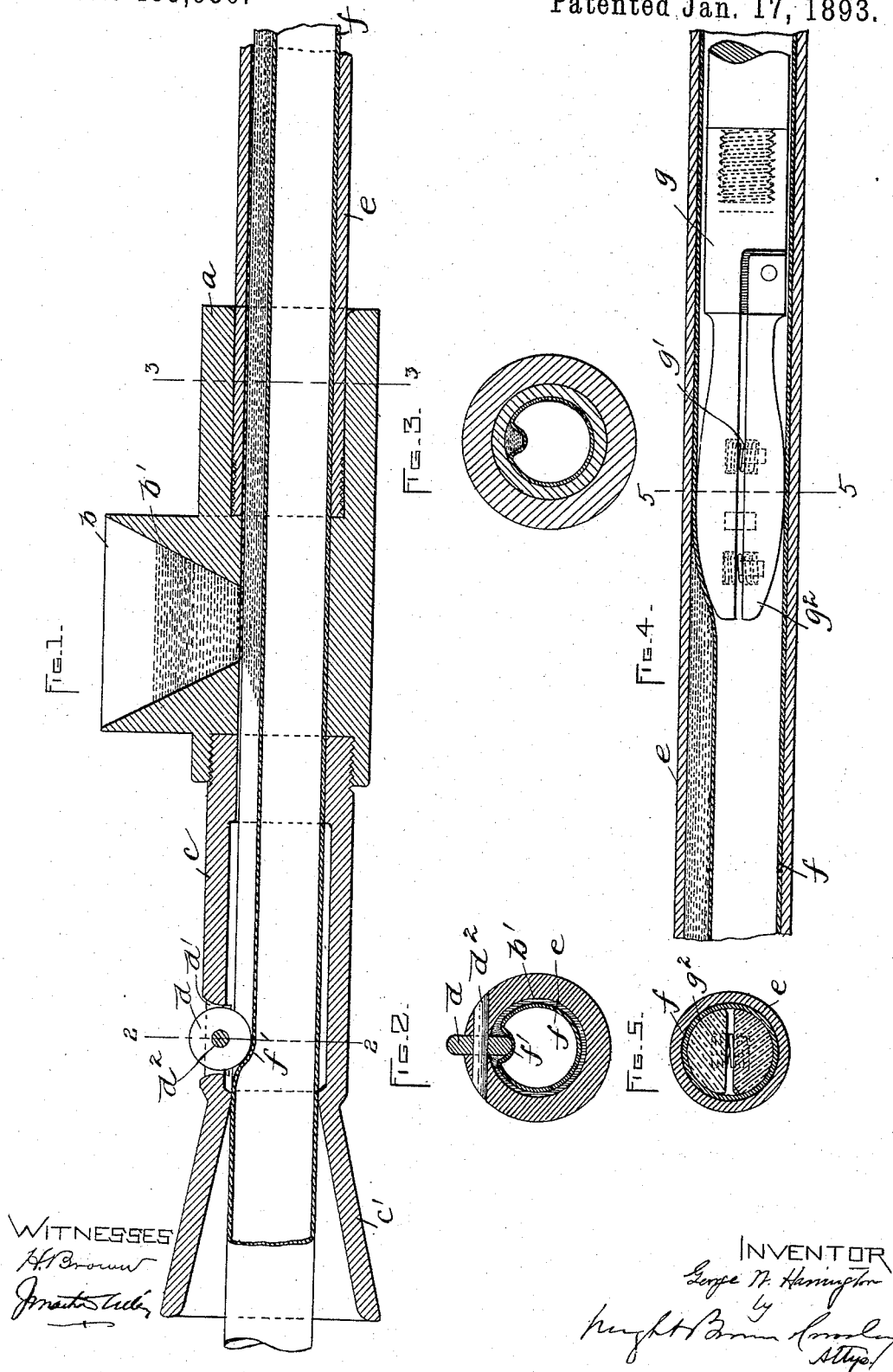


(No Model.)

G. W. HARRINGTON.  
METHOD OF AND APPARATUS FOR FORMING LINED PIPE.  
No. 489,950.  
Patented Jan. 17, 1893.



# UNITED STATES PATENT OFFICE.

GEORGE W. HARRINGTON, OF WAKEFIELD, MASSACHUSETTS, ASSIGNOR OF  
ONE-HALF TO D. H. DARLING, OF SAME PLACE.

## METHOD OF AND APPARATUS FOR FORMING LINED PIPE.

SPECIFICATION forming part of Letters Patent No. 489,950, dated January 17, 1893.

Application filed April 18, 1892. Serial No. 429,559. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. HARRINGTON, of Wakefield, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Methods of and Apparatus for Forming Lined Pipe, of which the following is a specification.

My present invention relates to a method of and apparatus for making lined pipe, and has reference more particularly to that class of pipes in which a lining of lead is introduced to protect the main body or shell from the influence of the fluid designed to be conveyed by the pipe, as described in a United States patent granted to myself and David H. Darling the 28th day of July, 1891, No. 456,927. In pipes of this character heretofore it has been found that handling of the same, jarring and other rough usage has had the effect of loosening the lining from the shell or body and thereby injuring the general efficiency of the construction.

With a view to remedying these faults my invention consists in drawing the lead into and through the main body or shell, forming a groove longitudinally on said lining as it is introduced into the shell and filling the groove with suitable cement, after which a plug or mandrel is inserted in the lining and the groove forced out against the shell or main body, thus distributing the cement about the lining to secure the same to the shell.

My invention further includes means for accomplishing these results, as will presently appear.

Of the accompanying drawings forming a part of this specification, Figure 1 is a longitudinal section showing the holder, a section of the main body or shell inserted therein, the opening for the cement, and the device for forming the groove or recess. Fig. 2 is a section on line 2, 2 of Fig. 1. Fig. 3 is a section on line 3, 3 of Fig. 1. Fig. 4 is a section of the pipe, showing the plug or mandrel for distributing the cement about the lining. Fig. 5 is a section on line 5, 5 of Fig. 4.

The holder *a* comprises a hollow section, internally enlarged at one end to receive the end of a section of pipe *e*. A hopper or receptacle *b* in the holder *a* is adapted to con-

tain cement, and to convey the same to the interior of the holder. A hollow section *c* has a flaring end *c'* and is screw threaded on the opposite extremity to be inserted in holder *a*. This section *c* serves as a guide for the insertion of the lining and is provided with an aperture *d'* in which a disk *d* is journaled. This disk extends within the periphery of the lining for a certain distance and thus forms a depression or groove therein when said lining is drawn under the disk. An expandible plug or mandrel *g* has tapering ends *g'* adapted to exert a yielding pressure upon the lining by springs *g'*, and is suitably secured to any desired means for inserting it into the lining.

The operation will now be clear. A section of the main body or shell having been inserted in the holder *a*, the lining is introduced into guide *c* and pulled through the holder and into and through the pipe by any suitable means. The disk *d* will form the groove *f'* as the lining proceeds, which groove will be filled with cement from hopper *b* as fast as the lining is delivered. When the desired length of pipe has been treated, mandrel *g* is forced through and the groove pressed outwardly, thus driving the cement around the lining and effecting an even distribution of the same between the main sheet and lining.

Although I have shown a mandrel adapted to exert a yielding pressure upon the lining, it is obvious that a solid mandrel may be used to effect the desired result. It is also obvious that I am not limited to any particular kind of cement.

I claim:

1. The improved method of making lined pipe, consisting in drawing the lining through the main body or shell, forming a longitudinal depression in the periphery of said lining as it is drawn into the shell, filling the space between the depressions and shell with cement as the lining progresses, and finally pressing the depressed portion of the lining outwardly against the iron shell, thus distributing the cement between the shell and lining, substantially as described.

2. An apparatus for making lined pipe comprising a holder adapted to receive at one end the main body or shell of the pipe, and at the

other end the lining, means such as a revolving disk whereby said lining is grooved or longitudinally recessed in its passage through the holder; an opening in said holder through which a suitable cement is introduced into the groove or recess, and a plug or mandrel for forcing said groove outwardly to distribute the cement about the lining, substantially as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of April, A. D. 1892.

G. W. HARRINGTON.

Witnesses:

M. W. JACKSON,  
A. D. HARRISON.