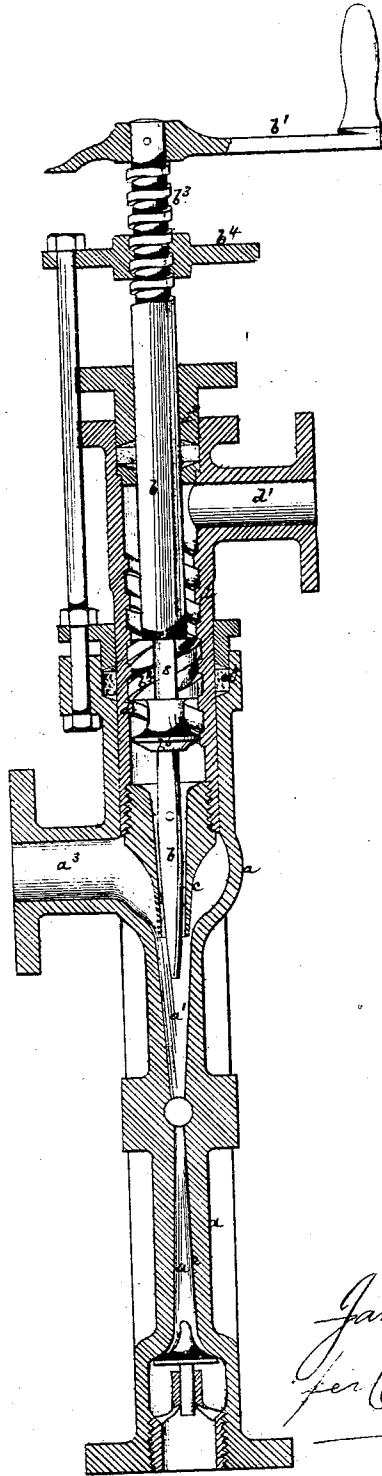


*J. Greatham,*

*Ejector.*

*No. 101,858.*

*Patented Apr. 12, 1870.*



*Witnesses:*  
*Fred. Haynes*  
*J. M. Coombs*

*James Greatham*  
*Per Charles Coombs*  
*Attorney*

# United States Patent Office.

JAMES GRESHAM, OF MANCHESTER, ENGLAND.

Letters Patent No. 101,858, dated April 12, 1870.

## IMPROVEMENT IN THE GIFFARD INJECTOR.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, JAMES GRESHAM, of the city of Manchester, in the county of Lancaster, England, have invented a new and useful Improvement in the Giffard Injector, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and which represents a longitudinal sectional view of a Giffard injector having my improvement applied to it.

My improvement consists in providing the central spindle of the injector with two screw-threads, the one of which threads screws through a fixed part or collar, and the other into a screw-thread formed in the interior of the ram or part to which the steam-nozzle is attached, so that, by turning the spindle, a double adjustment is obtained, that is, the steam-nozzle will be made to move in one direction to shut or reduce the water-space, and the cone-spindle will be made to move in the opposite direction to open or increase the steam-space, or *vice versa*.

By this improvement the most perfect and expeditious adjustment of the steam and water-spaces relatively to each other, may be effected by the working or turning of a single handle, with or under a reduced travel of the ram, which diminishes the play of the joint or flexible attachment that unites the ram with the pipe that conveys steam to it.

Referring to the accompanying drawing—

*a* represents the body part of the injector, in which the combining and receiving-cones *a*<sup>1</sup> and *a*<sup>2</sup> and the branch *a*<sup>3</sup> for the water-pipe are formed.

*b* is the central cone-spindle, rotated by a handle, *b*<sup>4</sup>, *c*, the steam-nozzle.

*d*, the ram in which the steam-nozzle *c* is secured.

*d*<sup>1</sup> is the branch for the steam-pipe.

The ram *d*, to which the steam-nozzle *c* is secured, moves in and out of the body part *a* of the injector through a stuffing-box *a*<sup>1</sup>, and the cone-spindle *b* passes through a stuffing-box, *a*<sup>2</sup>, in the end of the ram *d*.

The cone-spindle *b* has two screws formed upon it, one, *b*<sup>1</sup>, of which fits a thread upon the interior of the ram *d*, and the other, *b*<sup>2</sup>, screws through a fixed box, collar, or plate, *b*<sup>3</sup>, which may be carried by pillars from the body part of the injector, and notches may be cut out of the flanges of the ram to slide upon the pillars,

to prevent the ram from turning when the screw is rotated.

The interior screw *b*<sup>2</sup> has one or more spaces *s* cut out or down through it, to allow the steam to pass.

The direction of the two screws *b*<sup>1</sup> and *b*<sup>2</sup> upon the spindle *b* is the same, that is, both are either right or both left-handed threads, but the interior screw *b*<sup>2</sup> is of greater pitch than the exterior screw *b*<sup>1</sup>, the ratio preferably being about five to three, the interior screw being five and the exterior screw three.

The spindle *b* has a valve or valve-surface, *b*<sup>5</sup>, upon it, which valve fits against a seating upon the steam-nozzle, so that the steam can be perfectly shut off by the central spindle.

The steam branch *d*<sup>1</sup> is connected with a flexible or jointed pipe which will allow of the required movement of the ram for adjusting.

By means of the two screws *b*<sup>1</sup> and *b*<sup>2</sup>, working (as described,) the one within the ram *d*, and the other through the fixed collar or plate *b*<sup>3</sup>, the turning of the cone-spindle *b* through the handle *b*<sup>4</sup> effects a double or reverse adjustment, the one of the conical portion of the spindle *b*, and the other of the steam-nozzle *c*, to vary or adjust the steam and water-spaces above the combining and receiving-cones *a*<sup>1</sup> *a*<sup>2</sup>, to secure a proper working of the injector.

Both the ram *d* and cone-spindle *b* being thus reversely and simultaneously operated, said adjustment is necessarily effected in a most expeditious manner, and, to effect a given amount of adjustment, the ram *d* is required to move through a much less space than if the cone-spindle were stationary and the ram only moved.

This reduction in travel of the ram diminishes the strain upon or play of the joint or flexible connection which unites the branch *d*<sup>1</sup> with the steam-pipe.

What is here claimed, and desired to be secured by Letters Patent, is—

The combination of the two screws *b*<sup>1</sup> *b*<sup>2</sup> upon the cone-spindle *b*, for operation, the one in connection with the ram, and the other through a stationary box or plate, substantially as specified.

JAMES GRESHAM.

Witnesses:

W. H. DEAN,  
T. CRAVEN.