

UNITED STATES PATENT OFFICE.

JOHN INGHAM, OF APULIA, NEW YORK.

REACTING ROTARY STEAM-ENGINE.

Specification of Letters Patent No. 94, dated November 28, 1836.

To all whom it may concern:

Be it known that I, JOHN INGHAM, of Apulia, in the county of Onondaga and State of New York, have invented an Improved Mode of Constructing Rotary Steam-Engines; and I do hereby declare that the following is a full and exact description thereof.

This engine is of the kind denominated reacting, the steam escaping from apertures on one side of revolving arms in a manner well known but not hitherto so advantageously applied as in my machine. The steam from any suitable boiler is to pass in at both ends of the tubular shaft from a hub or projection upon which the revolving arms are to proceed. I usually employ four arms discharging the steam through two of them only at the same time in a manner, and for a purpose to be presently explained. By passing the steam in at both ends of the tubular shaft, the lateral pressure upon its bearings is equalized, and I am also enabled by a very simple contrivance instantaneously to reverse the motion of the engine. The ends of the tubular shaft revolve either in stuffing boxes or in close metallic fittings as may be preferred. The hollow arms which proceed as spokes from the hub, I inclose within a metallic casing which revolves with them thereby obviating all difficulty from the resistance of the atmosphere. This metallic casing may be made of any suitable kind of metal, but I in general make it in part of copper, and in part of cast iron in the following way. I take circular plates of sheet copper and raise it so as to give it the ordinary shape of a pot cover, that is to say convex on one side, and with a flanch or flat rim around its edge usually about one inch wide, the whole so formed that when two raised plates are put together, their convex sides shall be outward, and the flanchs lie flat upon each other. The copper casing is perforated at its center so as to pass over rebates formed upon each end of the hub to receive, and support them. And further to give them the necessary stability, and strength at the center, I have concave cast iron disks made which pass over, and fit onto the tubular shaft reaching out sufficiently beyond the hub to cover a portion of the copper plates to which they are to be firmly united by means of rivets,

they being also confined to the shaft by keys driven between them, and the shaft. The copper plates are also to be united around their edges by rivets passing through the flanchs, left for that purpose. The convexity of the plates need not be any greater than what is necessary to enable them to contain the arms between them.

The four arms are inserted into the hub, one pair in advance of the other so that their openings into the hollow shaft shall not be in the same transverse section. This is done for the purpose of commanding the admission of steam into them, as it is intended to pass into one pair only at a time, this admission of steam I govern by means of a piston fitting within the bore of the tubular shaft, and having a rod attached to it which passes out at one end, and slides back, and forth through a stuffing, or steam-tight collar. The piston as it is drawn forward or pushed back covers either the one or the other pair of openings leading to the arms, and determines which pair it shall pass through when the reversing motion is not required there may be two arms only.— the arms extend in length to the outer edge of the flanch, when they terminate, and the flanch may be thickened out, by the use of any light material so as to be equal to the thickness of the arms to save all resistance from the air. The apertures for the discharge of steam are made laterally close to the ends of the arms, the flanch being cut away opposite to these apertures so that it may escape unobstructed, these apertures open in a direction in one pair of arms the opposite from that in the other pair by means of which in connection with the arrangement of the piston before described. The direction of the engine can be instantaneously changed. I make adjustages, or nozzles of different sizes which I screw into the apertures so as to make the discharge of steam greater or less as may be desired. The two ends of the hollow shaft run in what may be called steam boxes, and I have said that these ends run either in close metallic fittings, or in stuffing boxes, when I use stuffing boxes in this or in any other part of the steam apparatus, I employ a mixture of tow or other fibrous substance with threads of any soft metal such as lead or tin which threads I produce to turning

the soft metal in the lathe so as to reduce it to the required state, two or three parts of this with one of tow I have found to answer for packing more perfectly than any
5 other material.

In describing this machine I have included many parts of which I do not pretend to be the inventor, and have introduced them merely to show their connection with
10 those parts which I do claim, which are the two following:

I claim—

1. The manner of reversing the motion by means of a piston fitted into the hollow
15 shaft, and covering one half of the openings

into the arms, and capable of being shifted at pleasure.

2. I also claim the manner of uniting the convex plates to the hub, and to the cast metal or other plates which pass over the
20 shaft by allowing the former to be received on to, and supported by a rebate on each end of the hub, and by riveting the outer edges of the latter through the inner edges of the convex plates, and keying them to the
25 shaft.

JOHN INGHAM.

Witnesses:

THOMAS P. JONES,
APOLLOS WILBUR.