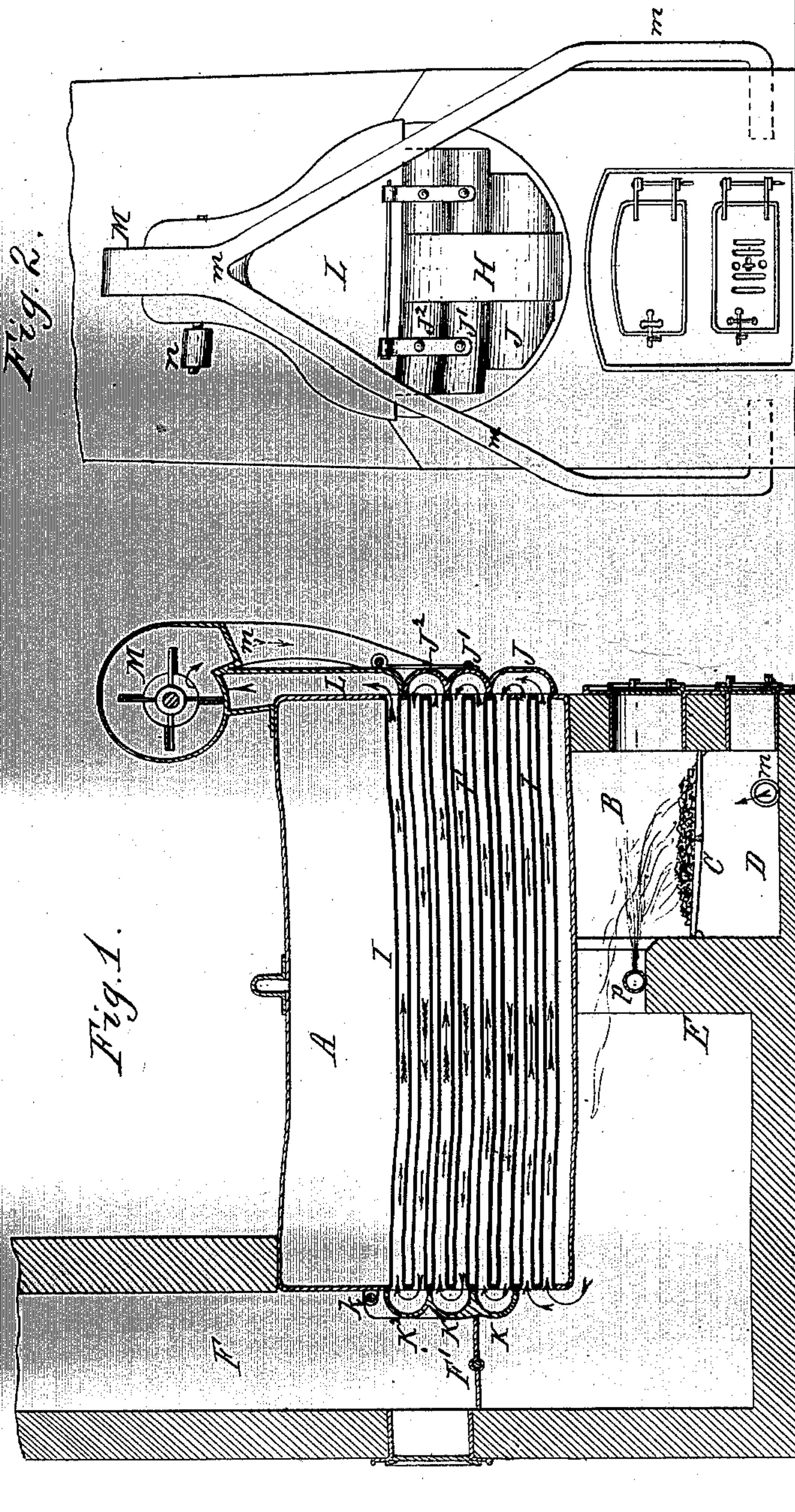


G. MANN.
Steam-Boiler.

No. 221,837.

Patented Nov. 18, 1879.



Chas. J. Buchheit.
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Witnesses—

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UNITED STATES PATENT OFFICE.

GEORGE MANN, OF BUFFALO, NEW YORK.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **221,837**, dated November 18, 1879; application filed August 26, 1879.

To all whom it may concern:

Be it known that I, GEORGE MANN, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Steam-Boilers, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to that class of steam-boilers which are provided with flues or tubes, through which the hot gases pass in their course from the furnace to the chimney.

The object of my invention is to establish a circulation of the hot gases through the flues or tubes and back to the furnace, where the hot gases are mixed with fresh air and brought in contact with the flame, and thus are completely burned or consumed before they are permitted to escape into the chimney.

My invention consists in the combination, with the flues of a steam-boiler, of a centrifugal fan, arranged to draw the unconsumed gases from the flues and discharge the same into the furnace, where they are brought in contact with the flame and consumed; also, in the combination, with the circulating-flues leading back to the furnace, of auxiliary flues leading to the chimney, whereby a constant draft through the latter is maintained; also, in certain details of construction of the flues, as will be hereinafter more fully set forth; also, in a perforated steam-pipe arranged transversely in the fire-passage, so as to throw jets of superheated steam toward the flame, whereby the intensity of combustion is increased.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal section of a steam-boiler provided with my improvements, the section being taken in line *x*, Fig. 4. Fig. 2 is a front elevation thereof. Fig. 3 is a longitudinal section in line *y y*, Fig. 4. Fig. 4 is a cross-section in line *z z* of Fig. 3.

Like letters of reference refer to like parts in the several figures.

A represents a horizontal cylindrical steam-boiler; B, the fire-chamber; C, the grate; D, the ash-pit; E, the fire wall or bridge; F, the chimney, and F' the damper. G G' represent two auxiliary flues, arranged centrally in the boiler, the lower flue, G, leading from the fire-passage below the damper F' to the smoke-box H at the front of the boiler, and the up-

per flue, G', leading from the smoke-box H to the chimney F.

I I' represent the circulating-flues, arranged in horizontal rows on both sides of the central flues, G G'. The circulating-flues are connected at the front of the boiler by smoke-boxes J J' J², and at the rear of the boiler by smoke-boxes K K' K², in such manner that the hot gases enter the lower tier or row of flues, I, at the rear of the boiler, and travel through the same to the front thereof and into the lower smoke-box, J, whence the gases pass into the second tier of flues, I', and travel through the same to the rear end of the boiler and into the lower smoke-box, K. From there the gases pass successively forward and backward through the remaining tiers of circulating-flues I I' and smoke-boxes J' J² K' K², and are finally discharged into the upper smoke-box, L, at the front of the boiler. The smoke-chambers J J' J² are secured together and hinged to the upper smoke-chamber, L, so that they can be swung upwardly out of the way when access to the flues is desired for cleaning or repairing the same. The rear smoke-chambers, K K' K², are similarly constructed and hinged to the boiler at *k*.

M is a centrifugal fan, having its eyes or suction-openings connected with the smoke-box L, so as to withdraw the hot gases therefrom. *m* is the discharge-spout of the fan M, which leads downward to the furnace and discharges the hot gases below the grate. The fan M is rotated by a belt running over a pulley, *n*, or by any other suitable means.

o is a steam-pipe connecting with the steam-space of the boiler, and having its discharge end *p* arranged transversely in the fire-passage above the fire-bridge E, so that it becomes highly heated by the flame passing over and around it. The discharge end *p* is provided with perforations on its rear side, through which jets of steam are thrown against the flame. The steam becomes superheated by contact with the heated pipe before it escapes through the perforations, and is consequently in a dry and gaseous form when discharged into the flame, and assists greatly in intensifying the combustion.

In starting the fire under the boiler the damper F' may be opened, when the draft will

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Fig: 1.

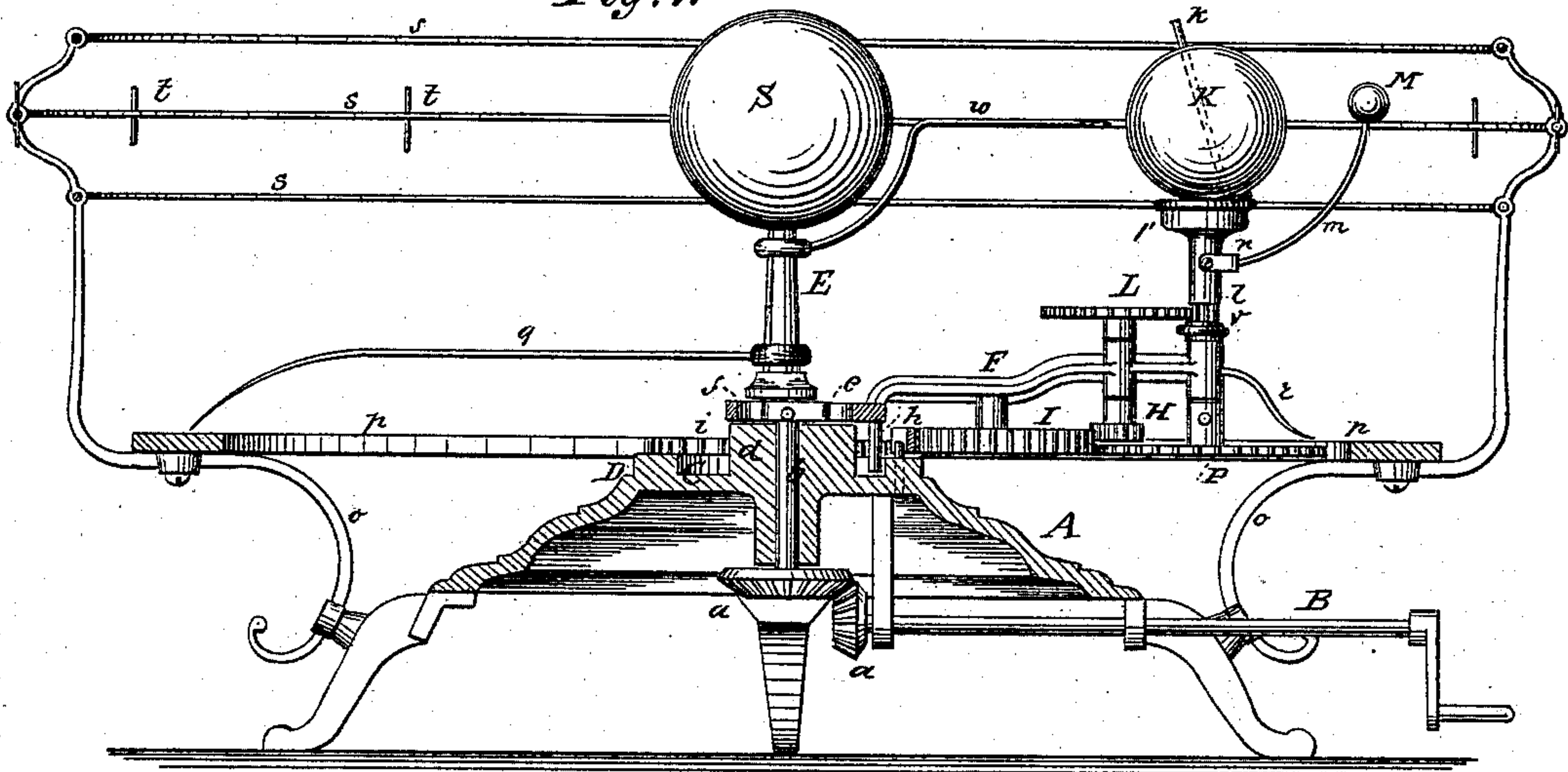
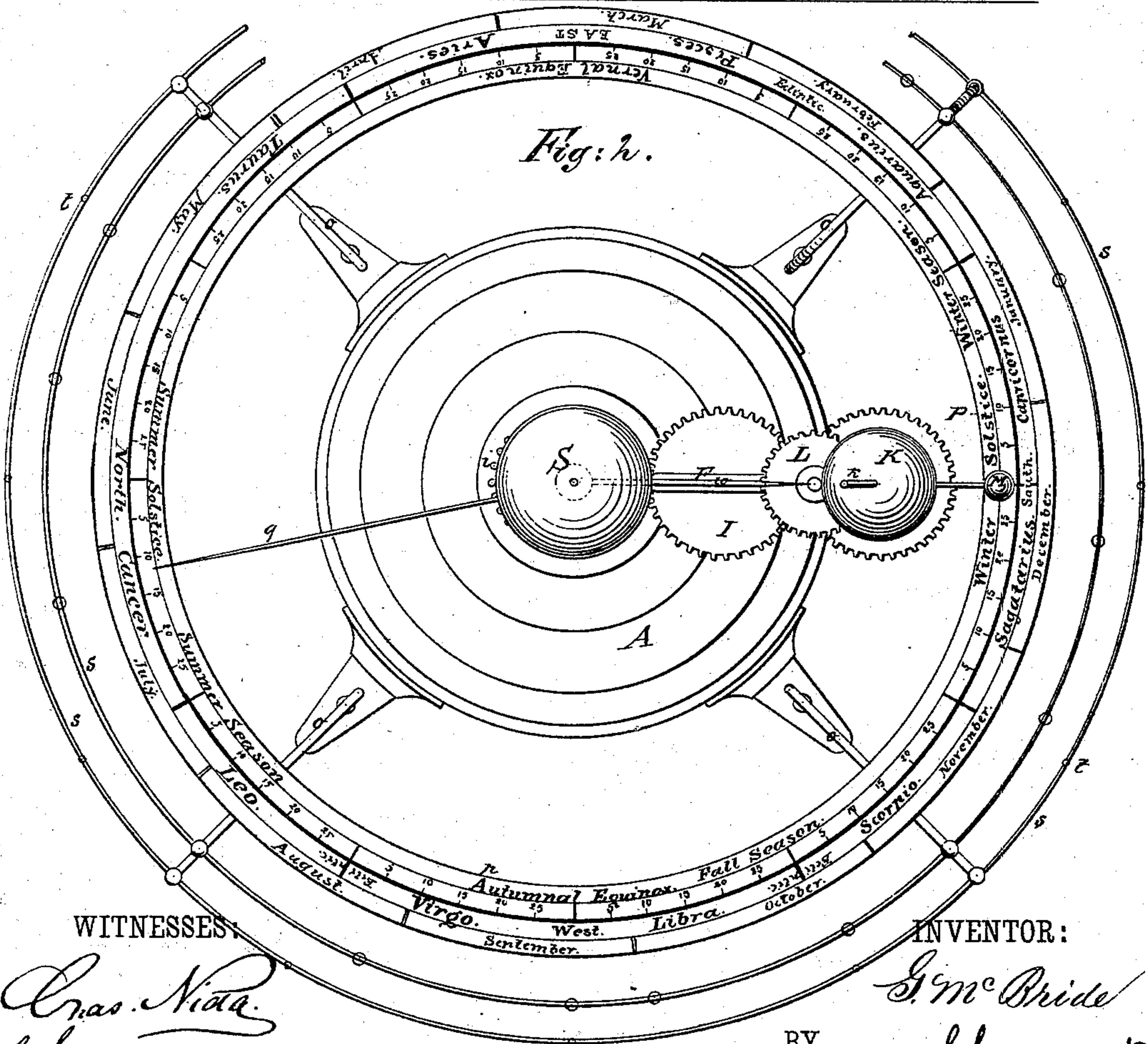


Fig: 2.



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