

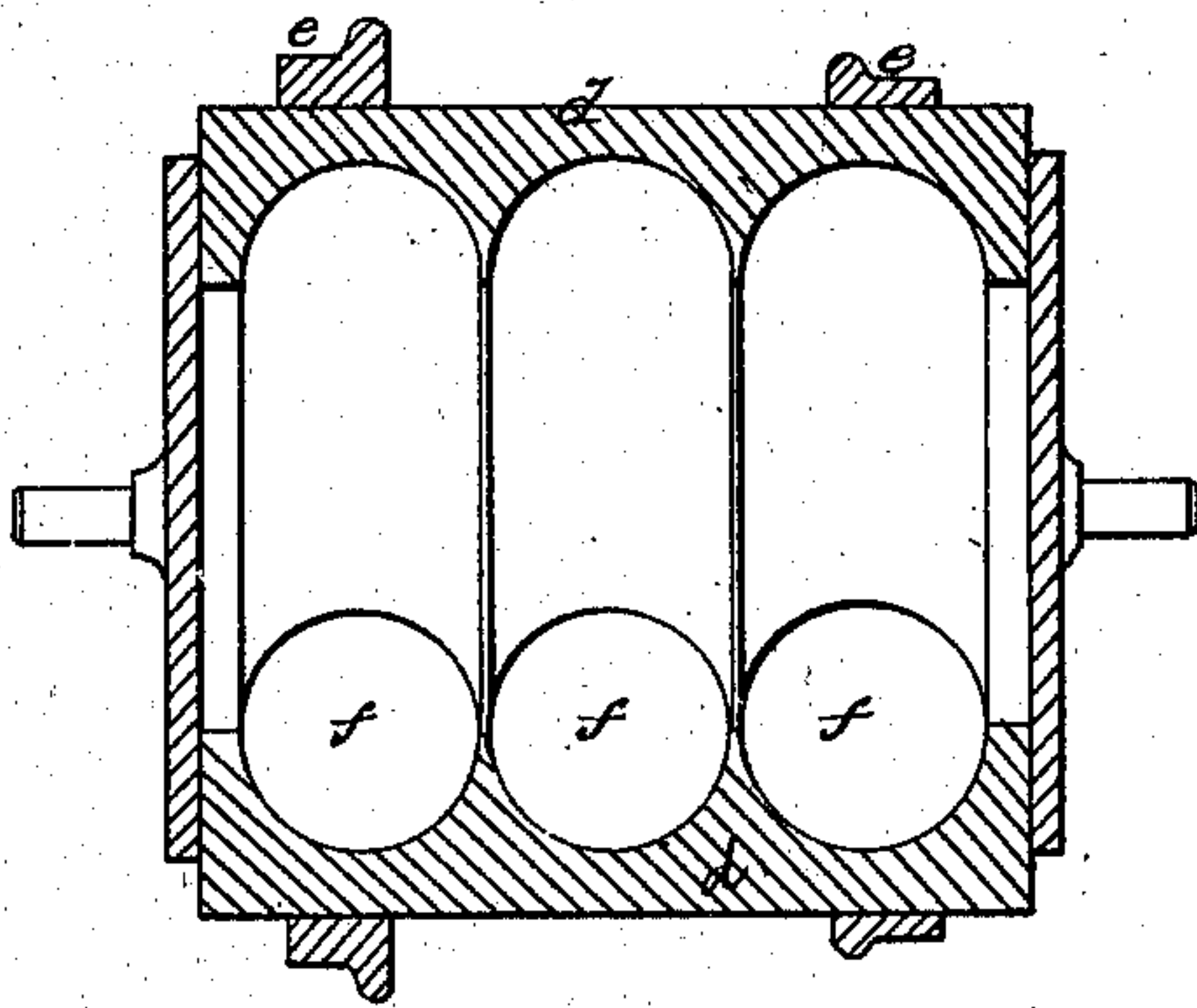
*L. Wray.*

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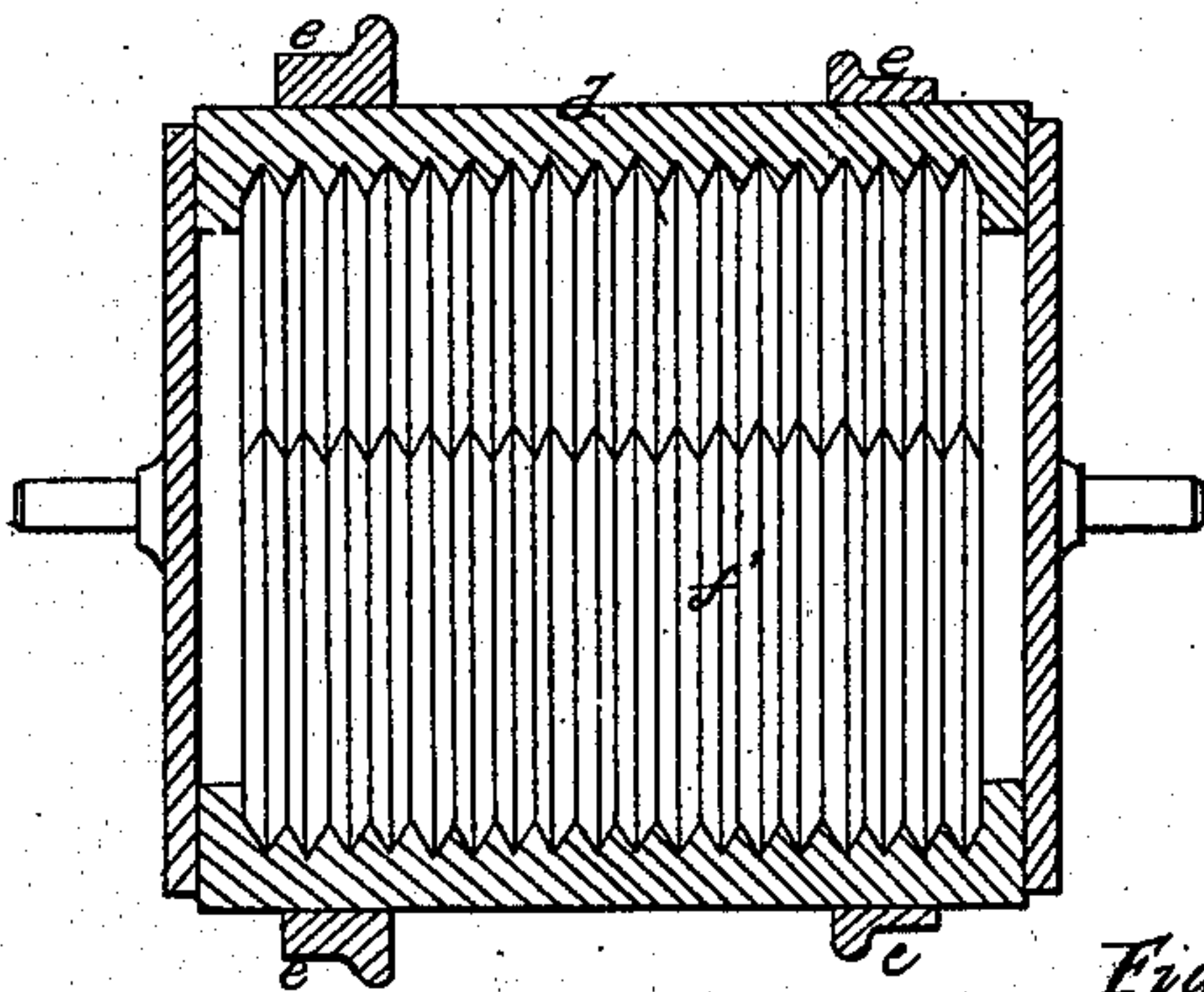
*N<sup>o</sup> 87,748.*

*Patented Mar. 9, 1869.*

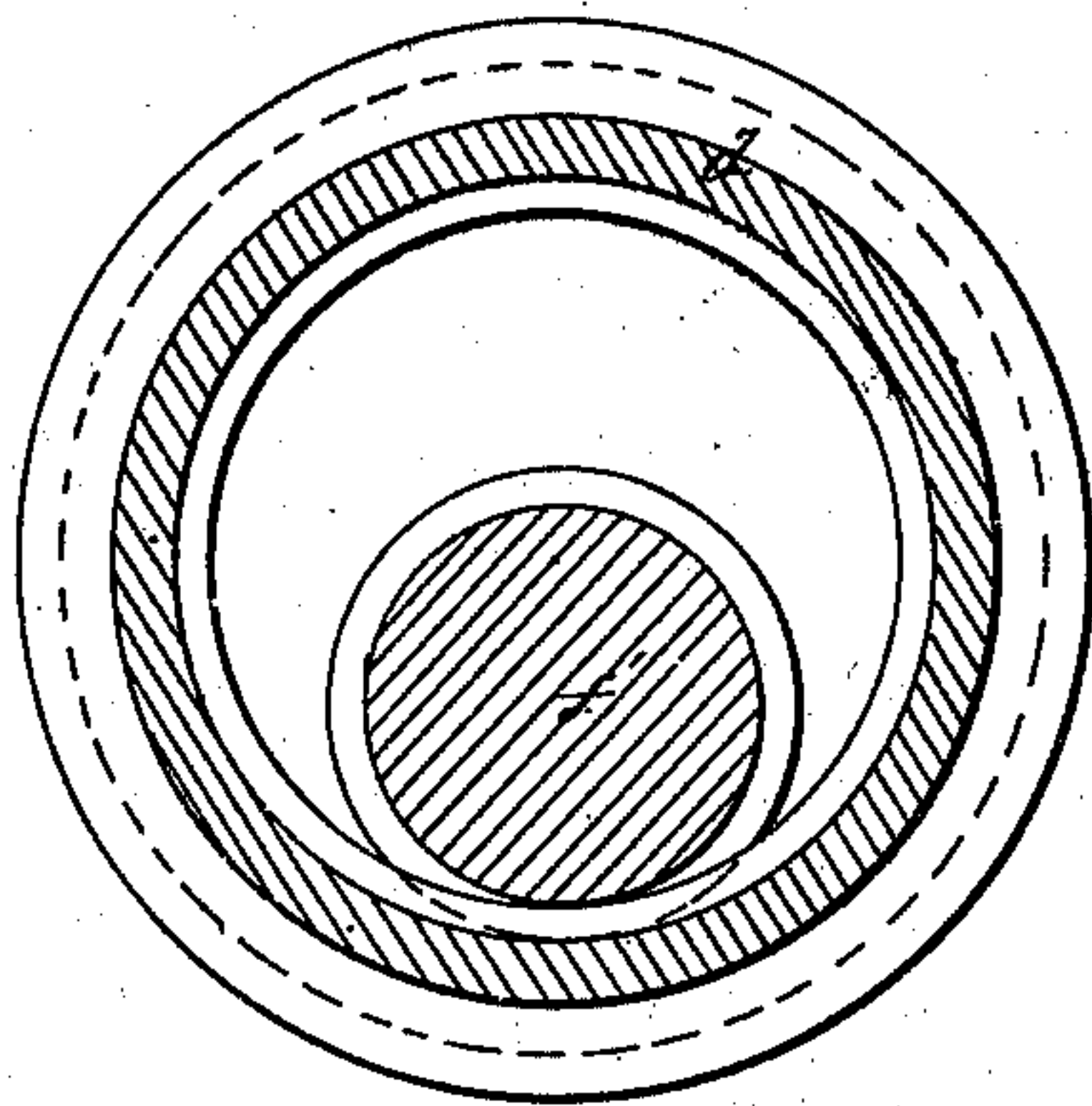
*Fig. 1.*



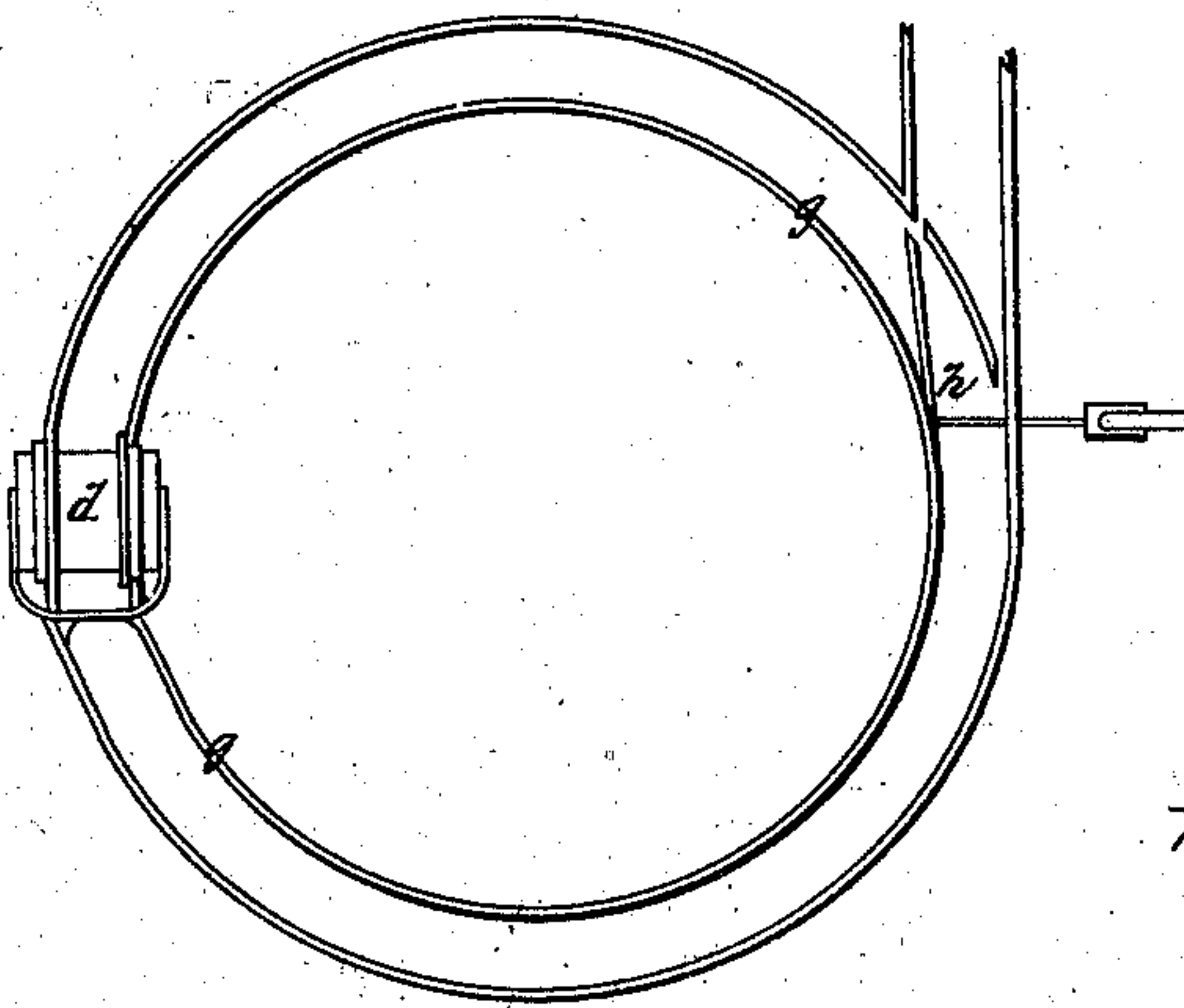
*Fig. 2.*



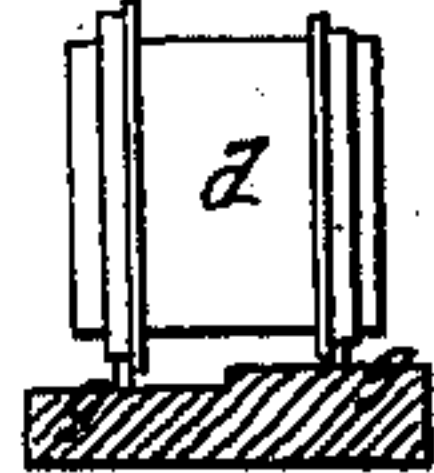
*Fig. 3.*



*Fig. 4.*



*Fig. 4\*.*



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# United States Patent Office.

LEONARD WRAY, OF RAMSGATE, ENGLAND.

Letters Patent No. 87,748, dated March 9, 1869.

## IMPROVED TRITURATING AND AMALGAMATING-APPARATUS FOR TREATING ORES OF GOLD OR SILVER.

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, LEONARD WRAY, of Ramsgate, in the county of Kent, England, have invented a new and improved Triturating and Amalgamating-Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention of improved methods of and apparatus for obtaining or separating metals from their ores, matrices, slimes, tailings, or other substances containing them, relates to those classes, or kinds of minerals, earths, clays, sands, gravels, or conglomerates, which contain gold or silver in any form, shape, or combination, and which may or may not require to be pulverized, washed, concentrated, triturated, or amalgamated, in order to facilitate the great object of separating and obtaining the precious metals existing in these substances, by washing, as in the case of tin, and some other of the refractory minerals, such as auriferous and argentiferous pyrites, sulphides, sulphurets, antimonates, or other combinations, containing gold or silver, or by direct amalgamation, as in the case of the precious metals.

My improved apparatus for effecting these objects consists of a machine which has for its object to triturate the ore or substance containing the metal until it is reduced to an almost impalpable powder.

In the triturating-machine, or apparatus, which forms my invention, the operation of amalgamation may, if desired, be carried on simultaneously with trituration, and therefore I denominate it my improved triturating and amalgamating-apparatus.

Two different forms of triturating-machine are shown in section in the drawings, at figs. 1, 2, and 3, which, in all cases, consists of a barrel or hollow cylinder, *d d*, provided externally with projecting grooves, hoops, flanges, rings, or other analogous devices, *e e*, which will admit of the cylinder or barrel being placed on and rolled along a railway, for the purpose hereafter explained.

An opening is made in one or both ends of the cylinder or barrel *d*, for the purpose of obtaining access to the interior, and for discharging and charging the machine.

In Figure 1, the cylinder or barrel is divided into three compartments, (it may, however, be either two, or one only,) whose section, in the direction of the axis of the cylinder, is concave, or semicircular, and in these semicircular spaces are placed one, two, or more heavy balls or spherical rollers, *f f*, which correspond in form to the internal shape of the cylinder. It is evident, however, that the cylinder may be plain inside, with a number of balls placed therein. By this construction of parts, a powerful grinding or triturating-action is obtained when

the barrels or cylinders are made to roll along the railway.

Figure 2 is a longitudinal section, and

Figure 3, a transverse section of a modification of the triturating-cylinder or barrel.

In this instance, the inner roller *f* is made of cylindrical form, with deep V-grooves, or serrations, throughout its entire length. Corresponding V-grooves are made on the internal surface of the rotating barrel or cylinder *d*, so that, as the latter is rolled forward, the V-grooves of the roller, by working in the V-grooves, or serrations of the cylinder, will grind and triturate the mineral substance contained in the cylinder, and will thus reduce it to an impalpable powder.

When operating upon auriferous or argentiferous ores, the cylinder may be supplied with mercury or mercury-amalgam, and, in certain cases, a series of amalgamated metallic disks, on a shaft, may be also fitted inside the cylinder, so that the metallic particles may be more speedily taken up and secured. Any number of these triturating and amalgamating-barrels or cylinders may be placed on a circular or other railway, constructed for the purpose, as shown in the plane view, Figure 4, and side view, Figure 4<sup>x</sup>, and may be rolled along it either by hand, labor, animal, steam, or other suitable power.

In Mexico, and other countries where animal-power abounds, mules, horses, or other animals may be harnessed to one, two, or more of the barrels or cylinders *d*, and made to draw them forward on the railway *g*, and, in so doing, the triturating-rollers *f*, figs. 1, 2, and 3, inside the barrels or cylinders *d*, will grind or triturate the substance to be operated upon, and this will be effected with a much less expenditure of power than if the barrels *d* were mounted on axes, and rotated in the ordinary manner.

When steam-power is available, I prefer to employ a small locomotive-engine, which will draw or propel along the railway *g*, at a moderate speed, several of the barrels or cylinders *d d*, and will continue so doing as long as may be desired.

I prefer to make the internal rollers *f* of my triturating-machines of iron, and, in order to increase their weight, they may be cast hollow, and be filled with lead.

The cylinders themselves may be made of wood or metal, and the large iron grooves for the balls, as also the iron serrations to suit the serrated rollers, may be made in sections, and fitted inside the cylinders. The serrated surfaces of the rollers may, in like manner, be made in section.

The circular railway *g*, fig. 4, is provided, at convenient places, with switches, turnouts, or points, *h*, so that, when the triturating-operation is finished, the barrels or cylinders (one or more of them) may be re-



moved from the railway, and other barrels or cylinders placed thereon.

Having thus described my invention,

I claim as new, and desire to secure by Letters Patent—

1. Triturating or reducing the ores to an impalpable powder by means of balls or rollers, either spherical or cylindrical, and either plain, grooved, or serrated, and placed in suitable cylinders or barrels, which are to be rolled along a railway, by any convenient power, in the manner and for the purpose herein set forth.

2. I claim particularly, causing the balls or rollers inside the cylinders or barrels to act on and triturate

the ore by rolling the cylinders or barrels on a railway, as herein shown and described, in contradistinction to mounting such cylinders or barrels on shafts or centres, on which they may be made to rotate by any suitable gearing.

The above specification of my invention signed by me, this 1st day of December, 1868.

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