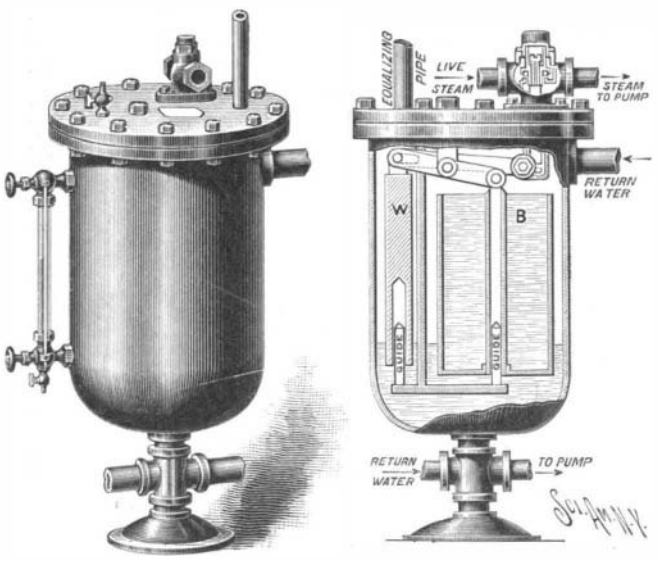
AN AUTOMATIC PUMP GOVERNOR AND RECEIVER.

In the steam-heating system of a building an automatic device should be provided, which receives the water of condensation from the radiator coils and pipes, controls the pumps, obviates the objectionable "hammering" of the pipes, and returns the water of condensation to the boiler while still hot. A device of this nature is made by the Creamer Steam Specialties Company, Jansen Hasbrouck, proprietor, of 126 Liberty Street, Manhattan, New York city.

The apparatus, as our sectional view indicates, comprises a receptacle (into which all water from coils, etc., drains) containing an open metal bucket, *B*, and a weight, *W*, twenty times heavier than the bucket, both hung from the ends of a lever fulcrumed at its middle. A second lever is fulcrumed at the weight end of the first lever and is connected with the vertical stem of the steam valve. As the water of condensation flows into the receptacle and into the bucket through the return pipes, the weight descends, pulling down the corresponding end of the lever, thereby opening the steam valve and automatically starting the pump. When the water within the receptacle has been pumped out, the distribution of weight is reversed, the filled bucket now being twenty times heavier than the weight; hence, the weight is raised, the steam valve closed, and the pump stopped. As the water again accumulates in the receptacle the bucket is buoyed up, and the operation begins anew.

The apparatus is now in use in many large office buildings and institutions, in connection with pumps of all kinds. In old and new buildings it will completely obviate all those objectionable noises in steam pipes which are occasioned by the collection of the water of condensation. The returning of this water of condensation in its heated condition to the boiler is another of the advantages incident to the use of the device.



AN AUTOMATIC PUMP GOVERNOR AND RECEIVER.

QUICKSILVER FOUNTAIN AT EARL'S COURT, LONDON.

Mr. Charles Bright, F.R.S.E., the well-known English electrical engineer, has recently devised a complete novelty in fountains for the Queensland government's show at the Earl's Court Exhibition, in which it now forms the main center of attraction. Its *raison d'être* comes about owing to Queensland being anxious to attract attention to mercury as an important product of that country, and here Mr. Bright, judging from the crowd which daily gathers round the fountain, seems to have given them an apparatus more likely than any to produce this effect. When it is remembered that mercury has a weight nearly fourteen times that of water, it will be seen that the problem was no easy one. In order to describe this invention in anything like detail we must first refer our readers to the accompanying drawing.

The mercury falls from an upper bowl about 4 feet in diameter to one some 7 feet below, and about 7½ feet in diameter. This entire device is coated with black paint to show off the silver. The price of mercury runs at about 2/6 per pound as often as not—and, as we know, a pound of mercury does not go very far in bulk; thus one of the main considerations in view was to employ as small a quantity as possible, and anything like an imposing Niagara Falls of the liquid metal was soon ruled out of court. Thus, the upper basin is filled up with cement by way of converting it into a flat table with some sixty-four grooved channels at 2-inch intervals round the lip to conduct the quicksilver in modest quantities over the edge.

Similarly things are so regulated that there is just enough mercury in the lower bowl to float a number of household flatirons and chunks of rock; and it is here that the man in the street is impressed with the fact that it is mercury and not water that is sent through the fountain.

The lower basin is drained off by a drain pipe 80 feet in length and 1½ inches in diameter, which conveys the quicksilver to a tank conveniently placed, and, of course, at a slightly lower level. This tank acts as the means of supply to an elevator for furnishing the required head of the liquid mercury. The elevator is constituted by a number of small, stoutly built steel cups (3½ by 2¼), attached at intervals to an endless bicycle chain which is kept running through the store tank. As each freely suspended cup approaches the lower tank a tilting system enables it to pick up its cup full of mercury. The loaded cups are from here led up to a reservoir tank at a height of 14 feet above the other, where each in turn empties its contents. From this reservoir the quicksilver is carried through a pipe some 100 feet in length and 1 inch in diameter back to the upper bowl of the fountain. On its way, however, the mercury is run through a fine wire gauze filter which frees the running mercury from the impurities which superficially collect from the atmosphere.

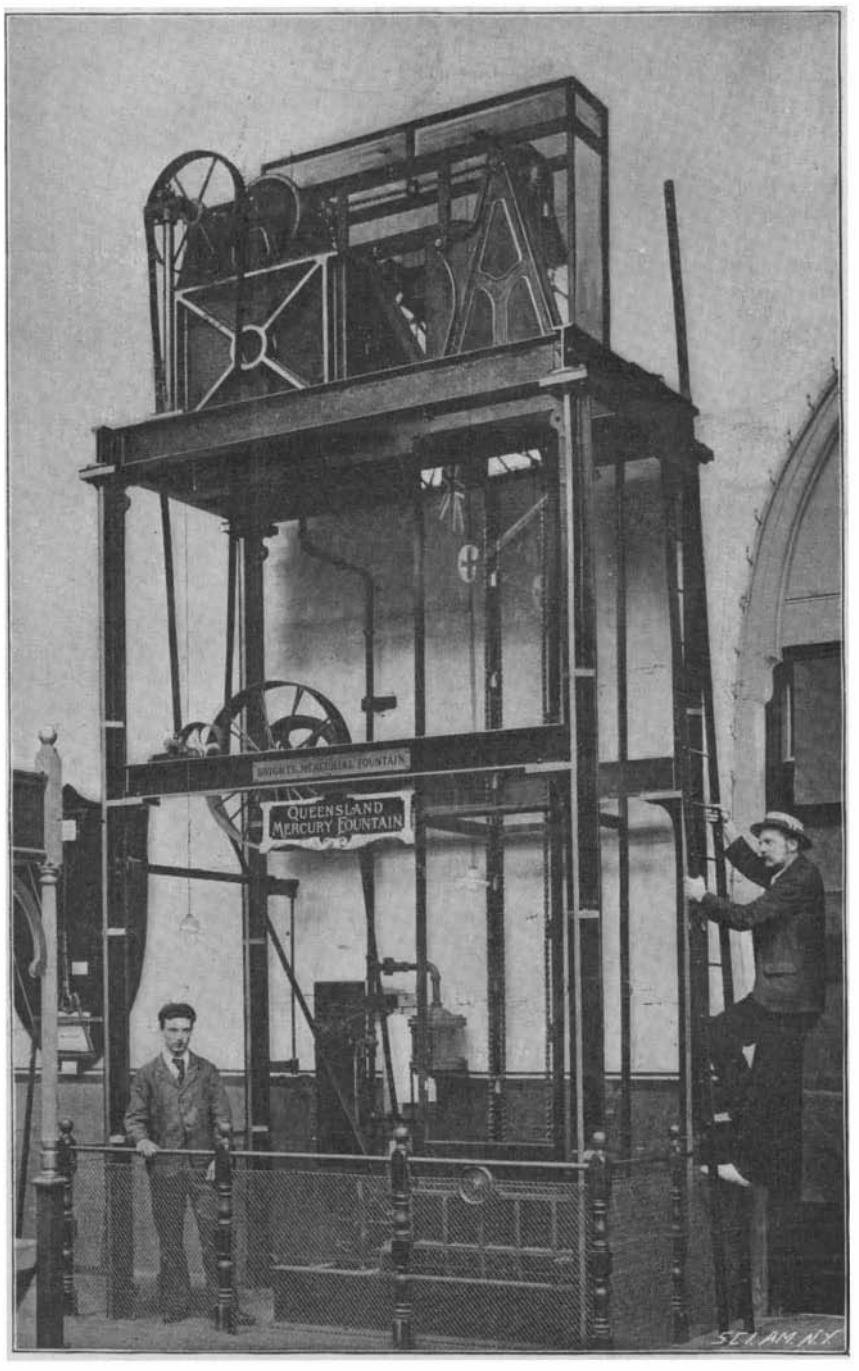
The 2½ tons of mercury employed for this striking apparatus represents alone some $2,970 in value.

Each of the tanks has about 2 cubic feet of mercury in it. The number of elevator buckets is twenty-eight, placed at 20-inch intervals along the chain; and as each holds some 10 cubic inches (5 pounds), the supply of mercury is worked at a rate of over 7 tons per hour. Both the delivery and return pipes are lined with glass (mainly to reduce friction to a minimum), and the head of mercury in the reservoir tank is equivalent to 6 feet above the height of the top basin. The elevator is most satisfactorily worked by a 2 horse power electric motor of the new Langdon-Davies (alternating current) pattern.

Both the fountain itself and the machinery to work it are lighted by electricity, and the effect at night of the spray of mercury falling, with the light glistening between, is truly entrancing. The only gold medal of this show has been awarded to Mr. Bright for this highly ingenious and novel invention.

PAPER may be rendered fireproof for making flashlight reflectors or for other purposes by moistening with the following solution: Ammonium sulphate, 8 parts; boric acid, 3 parts; borax, 2 parts; water, 100 parts; sodium tungstate can also be used, and a solution of common alum is often efficacious, but it tends to loosen and disintegrate the paper.

QUICKSILVER FOUNTAIN AT EARL'S COURT, LONDON.



ELEVATOR AND TANKS FOR OPERATING QUICKSILVER FOUNTAIN.

Our Growing Trade in China.

American products seem to be gaining favor more rapidly in China than those of any other nation. The report of the Inspector-General of Customs of China for the year 1898, just received by the Treasury Bureau of Statistics, shows an increase of nearly 40 per cent in imports into China from the United States, while the increase in total imports is less than 5 per cent. Our imports into China in 1898 were17,163,312 Haikwan taels, an increase of 4,723,010 taels over 1897, while those from Great Britain, our most active rival in Oriental trade, fell from 40,015,587 taels in 1897 to 34,-962,474 taels in 1898, and from the Continent of Europe the 1898 imports also showed a reduction of nearly 1,000,000 taels. The imports through Hongkong are largely of European origin and amounted in 1898 to 97,214,017 taels, against 90,125,887 taels in 1897. Even if all the imports into China from Hongkong and Macao are of European origin, combining them with those from Great Britain and the Continent of Europe, they show a gain in European products imported into China in 1898 of less than 1 per cent, while those from the United States, as already indicated, show a gain of nearly 40 per cent. The value of the Haikwan tael, according to the latest estimate of the Director of the United States Mint, is 71 8 cents.

Fig. 4.—A BICYCLE BUILT FOR A HEAVYWEIGHT.

Our principal exports to China are cotton goods, kerosene oil, flour, provisions, railway material and engines, manufactures of iron and steel, manufactures of wood, and manufactured tobacco. The Chinese customs service, as is well known, has been for many years administered by Englishmen selected for that service by the Chinese government because of their familiarity with customs laws and commercial methods throughout the world. Their reports relating to the commerce of the year 1898, comparing it with that of previous years, contain many interesting statements showing the gains which American products are making in the import trade of the empire.

The Statistical Secretary, Mr. F. E. Taylor, in his general report on the Commerce of China for 1898, says: "The value of the trade in cotton piece goods has remained practically stationary for three years, but there are certain movements in the trade which deserve attention. Dutch goods are rapidly losing ground; Dutch sheetings have disappeared; they cannot keep pace in price or quality with those of the United States. Manchester can no longer compete with the United States in the exportation of drills, jeans, and sheetings, owing to the lower prices at which the latter country can land this class of goods in China. White and refined sugar and American flour are being bought more freely, which, as indicating increased ability to purchase luxuries, may be taken as a sign of prosperity."

Customs Commissioner Huges, of Kiukiang, speaking of the progress of the kerosene oil trade, says: "The American oil still maintains its supremacy, and judging by our figures of the last two years, seems to be leaving its Russian rival farther and farther in the background." Customs Commissioner Moorehouse, of Amoy, writes: "Imports of American flour increased considerably, 98,898 piculs (133⅓ pounds) being consumed, as compared with 52,089 in 1897. American flour can be laid down at a less cost than flour ground locally from native wheat." Customs Commissioner Walter Lay, of Newchwang, writes: "Both American drills and American sheetings have come into great favor here, the demand for them having become quite phenomenal." Customs Commissioner Hippisley, of Tientsin, says: "The imports show a net value of 32.600,000 taels, or 2,400,000 taels over that of 1897. Cotton piece goods advanced from 14,-750,000 to 16.000,000 taels, all of which is practically due to increased receipts of American makes, which now represent about one-half of this branch of the trade."

All of which clearly indicates to American manufacturers and exporters the truth of the maxim that "nothing succeeds like success." The success of the American navy in Pacific waters last year is doubtless largely responsible for bringing our national being more emphatically before the half-wakened buyers of the Orient. Now, while we are on an upward wave, is the time for those having goods suited to that trade to bring them into active competition with those of Europe. And it should ever be remembered that China does not yet know what she wants, simply because she does not know what exists. There are countless articles of our production that will there find an enormous market if their utilities are once explained to them, of which the Chinaman is to-day in absolute ignorance of even the need for.

An Ancient Barrel Organ Unearthed.

Barrel organs were formerly quite frequent in English churches, and one has recently been unearthed in a church near Rochester, England. It has six stops and six barrels and is capable of grinding out sixty tunes in all. Among them are such archaic specimens as "Job," "Old 11th." The organ was operated by the sexton.

A Novel Apparatus for Teaching Geology.

Strange to say, there are few pieces of apparatus which can be obtained in the world to-day which will assist in teaching geology. One of the most interesting we have seen was designed by Professor G. A. Lebour, of Durham College of Science, Newcastle-on-Tyne, and which was published in Nature. The machine is for making folds of rock, and as may be readily understood, a large number of fold forms of rocks can be reproduced, and their consequences, such as thrusts, faults, etc., can be demonstrated.

It consists of two parallel wooden rollers about 3 feet apart and 4 inches in diameter. A shaft at right angles turns the two rollers in opposite directions by means of toothed bevel wheels, the shaft itself being driven by a worm-wheel and worm. One turn of the handle causes only $\frac{1}{48}$ of the turn of the shaft and rollers, so that a very slow motion can be imparted to the latter. A sheet of India rubber is firmly attached by a slot and screwed to each roller. This completes the arrangement, the rollers being wound through about one entire revolution and the India rubber being thus stretched, and layers of cloth, clay, paste, or other material are laid upon it. The handle is then turned in the reverse direction and the India rubber is gradually released. Folds are in this way shown slowly growing, the broad elastic band simulating the contraction of a portion of the earth's course and producing various geological forms. Various weights may be applied and different effects can be obtained, thus giving an idea of the results which have actually been produced in nature under great pressure, that is to say, at great depths.

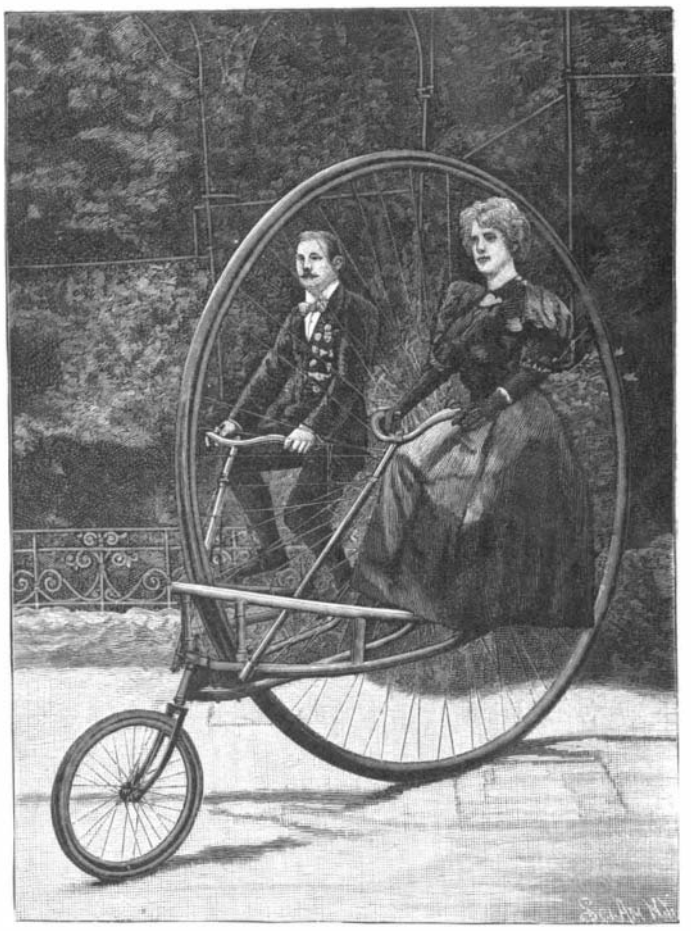


Fig. 3.—A BICYCLE BUILT FOR TWO.

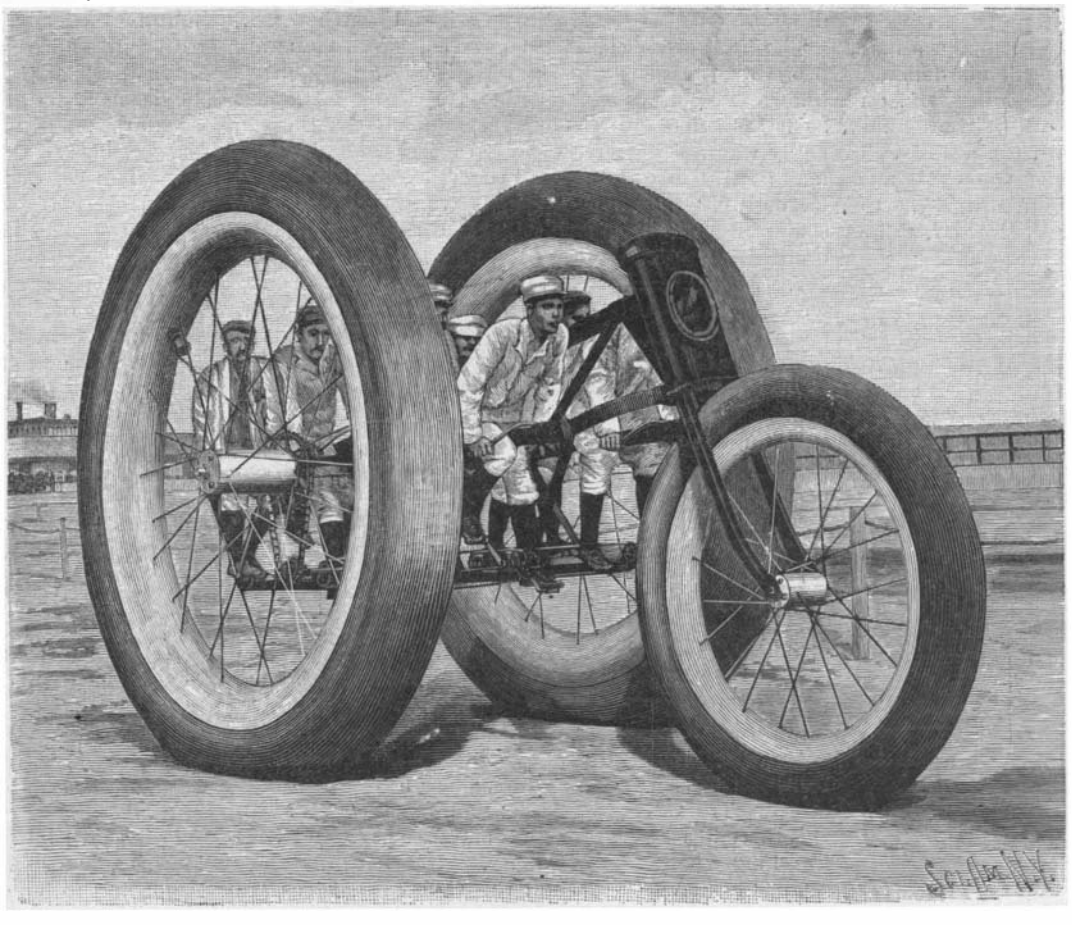


Fig. 2.—THE LARGEST TRICYCLE IN THE WORLD.

GROTESQUE FORMS OF CYCLES.

We illustrate herewith, from Lectures pour Tous, some curious things in the way of cycle advertising that were to be seen at a "Great Cyclist Meeting" (as the programme of the affair styled it) that took place recently at Holburn Viaduct, England.

Fig. 1 represents a gigantic bicycle that was displayed by Messrs. H. A. Lozier & Company, the manufacturers of the Cleveland bicycle. It was, of course, constructed simply for show and as an advertisement of the firm's machines. Each wheel is 19½ feet in diameter and was provided with pneumatic tires 8 inches in thickness. The saddle is large enough to accommodate eight men. The size of the machine can be judged of by comparison with the bicycle of ordinary dimensions that is seen leaning against the front wheel.

Fig. 2 shows a huge tricycle constructed for the Wowenhoe & Rübler Company, of Boston, in order to serve as an advertisement for the new rubber tires of the Vim system. It was capable of carrying eight cyclists. The two driving-wheels are 13 feet in diameter, the steering-wheel 7½ feet. The wooden rims were provided with rubber tires 14 and 16 inches in thickness. Each driving-wheel hub is 16 inches in length. The steel spokes are one-fifth of an inch in diameter. The whole machine weighed 2,236 pounds.

Fig. 3 represents a bicycle called "The Sociable," devised