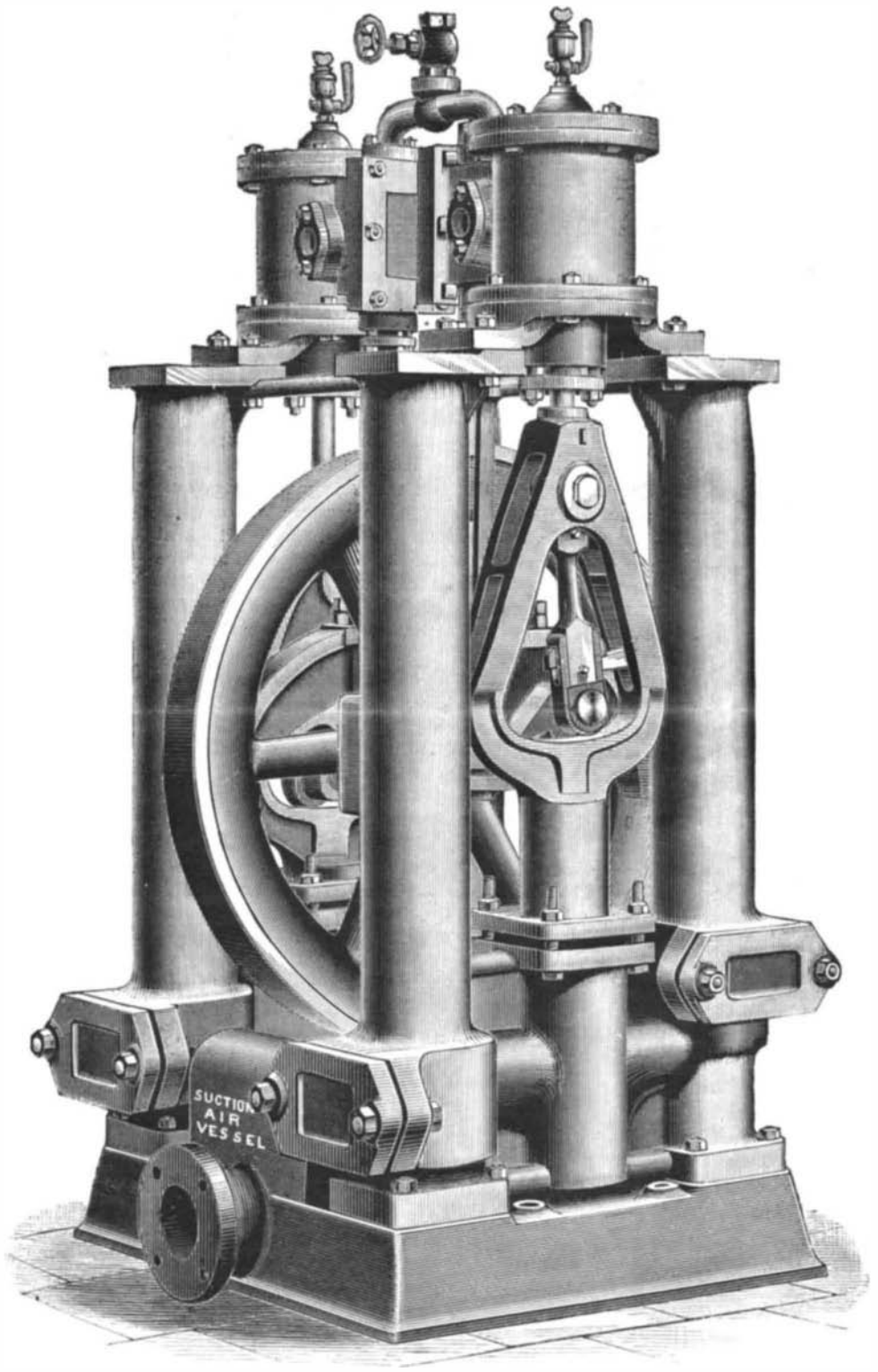
defective flues and furnaces, 687; bad arrangement of stoves, 275; escaped gas, 345; fat, varnish, etc., boiling over, 323; foul chimneys, 1,729; fireworks, 482; heat from grates or flues, 340; hot coals from grates, 133; incendiary, 347; kerosene lamps falling, 1,287; overheated stoves and pipes, 858; sparks from chimneys and engines, 900; spontaneous combustion, 457; vapor of naphtha, gasoline, etc., 88; window curtains catching fire, 907; malicious mischief, 236. Of the 17,500 fires that occurred in the city during the period named, about 15,000 are accounted for under some of the above heads. With the exception of incendiary or malicious mischief, there is not one of them that might not have been prevented by ordinary care and forethought. It is estimated that at least a hundred million dollars is the money value of the loss sustained.

## IMPROVED DOUBLE-ACTING STEAM PUMP.

The accompanying illustration represents a double-acting steam pump which for simple but substantial construction and effective and reliable working has gained considerable favor in England. It is the specialty of Hulme & Lund, Manchester, and is particularly suitable for the drainage of deep mines, some pumps of this class being at work at the present time forcing water 1,200 feet vertically in one lift. Four substantial columns support the steam cylinders and serve at the same time as air vessels for the pumps. The steam valves are of the ordinary kind, worked directly from eccentrics on the shaft below. The water valves are furnished with separate bonnets or doors, and are therefore at all times capable of easy inspection. The flywheels are heavy, and are turned true, so that they run with accuracy and will carry a belt for driving purposes. In all parts the most suitable materials are employed. The connecting rods and shafts are made of the best scrap iron, the piston and valve rods of steel, and the glands, bushes, steps, eccentric straps, and water valves are all of the best gun metal. The pistons are furnished with metallic packing, and the joints throughout are planed and faced. All the working parts and the packings are easy of access and of ready adjustment. Pumps of this class are specially made, capable of pumping against any pressure up to 1,000 lb. per inch.




DOUBLE-ACTING STEAM PUMP.

### A Hoisting Engine without Drums.

A simple and effective hoisting plant has been put into an underground shaft of the Maria Colliery, near Hoengen, in the Wurm District. The endless wire rope reaching down to the lowest part of the shaft, 886·5 feet deep, lies on a sheave placed directly over the shaft. The diameter of the sheave is made to correspond to the distance between the centers of the two hoisting compartments. The sheave has a very deep groove, so that the rope cannot slip. The cages, for two mine cars of 1,000 lb. capacity, are placed side by side, so that there is room for a wrought iron tube, through which the rope passes. The cages are fastened to the rope by strong screws. The two-cylinder hoisting engine is placed on a level with the center of the sheave and runs it through the medium of gearing, which acts upon cog wheels wedged on to each side of the rim of the sheave. Drums are thus entirely dispensed with. The engine, which is run by compressed air, has 13·4 inch cylinders and 31·5 inch stroke, with a Farcot expansion gear. It is running with 60 lb. pressure, and can easily manage 200 tons per shift of 12 hours. It is noted that the machine occupies little room, because there are no drums, and the sheave need not be placed as high. The wear of the rope is less, because it is only bent once, and the position of the hoisting cages may be readily changed. The *Zeitschrift für Berg-, Huetten- und Salinen-Wesen*, from which we gather the details given above, calls attention to the fact, however, that in case of breakage, the cages and the rope would be a total loss.

### Prolific and Long-Lived Families.

The Hartford, Conn., *Post* says that among recent applicants for life insurance was one of 53 years, whose fifteen living sisters were from 35 to 63 years old, their ages running as follows: 35, 36, 38, 40, 42, 43, 45, 47, 49, 51, 55, 57, 59, 61, 63. Another applicant stated that he was 37 years of age, and that he had eleven brothers and ten sisters. His father died at the age of 65 years, but his mother was living at 67 and was in good health. The ages of the children, twenty-two in number, ranged from 16 years to 47. The applicant was a Virginian. A third case was of a man 32 years of age, who had eleven brothers and five sisters. His father was 68 years of age, and had just married his fifth wife. An applicant from Brooklyn belonged to a long-lived race. His father had died at the age of 80 years, his grandfather at 108, and his great-grandfather at 110 years of age, the average age of the three being a trifle less than 100 years.

### Distilling Alcohol by Ice.

M. Raoul Pictet, of Geneva, so well known for his discoveries of the liquefaction of gases, announces the discovery of a method of distilling alcohol by ice. Two kilogrammes of ice are needed for the production of a liter of alcohol; that is, for the distillation of 110 gallons of alcohol a little less than a ton of ice will be required. The cost of production will include only coal for working the steam engine which drives the air pump, and the sulphuric acid, the evaporation of which produces the ice. M. Pictet declares that this will notably diminish the expense of distillation.

### Large Cast Iron Wheels.

Three flywheels have been lately cast at Mr. Lycett's foundry, Wolverhampton, England, each wheel weighing 40 tons in the rim, and cast in one piece. The diameter is 26 feet; depth, 23 inches; and measure across the face, 15 inches. Each rim will have eight arms affixed, which will weigh about 25 tons, making the total weight of each wheel 65 tons. Flywheels weighing 60 tons have been cast in this district before, and some of them with a diameter of 30 feet, but it is believed that they have all been cast in either two or four segments, one great reason for this being that it would be impossible to convey such a ponderous piece of machinery *en masse* along a road. Casting them whole reduces the cost. The operation of casting occupied seven minutes.

### NEW INVENTIONS.

Mr. Daniel D. Clark, of Mystic, Conn., has patented a new device for removing the motes that falldown from the saws of a cotton gin when the lint is being brushed off of the saws. The invention consists in providing a cotton gin with a mote receiver, consisting of a longitudinally flanged cylinder that straightens the cotton it leaves the saw, knocks the sand and trash out of it, and deposits the motes in a receptacle beneath it.

A new and improved tie for bales of cotton, hay, wool, etc. has been patented by Mr. James L. Griffin, of Cusseta, Tex. The invention consists in a metal band provided with a series of longitudinal slots at each end in combination with a plate with a button fitting into these slots on its under side, this button being passed through the slots of the two overlapped ends of the strip or band, then turned a quarter revolution when the bale has been compressed sufficiently.

An improved saddle girth fastening and harness buckle has been patented by Messrs. Isaac I. Lancaster and Homer A. Sears, of Goldendale, Washington Ter. The invention consists in a novel construction of a plate and a pair of pivoted spring pawls, a novel girth, and certain details of construction by which provision is made for securely and quickly tightening or loosening the girth.

Mr. William A. Lorenz, of Brooklyn, N. Y., has patented an upright piano case. The object of this improvement is to utilize the tops of upright piano cases for holding books, sheet music, etc., by making it possible to open a cover or lid for the purpose of increasing the volume of sound without disturbing the top.

Messrs. F. W. Jensen and Carl J. L. Olsen, of New York city, has patented an improved hospital bed. The improvement relates to the construction of the bedstead, and to devices combined therewith for the use of the sick person. The inventors use an iron frame bedstead, the bottom of which is formed by longitudinal rods sustained by crossbars and held in place by nuts at their ends. The head and foot boards are hung in slots in the side rails, so that they can be adjusted or swung down out of the way to give free access to the person on the bed. Combined with the bed there is a swinging arm carrying a vessel fitted for being raised to carry the vessel through an aperture provided in the bed bottom and mattress. The bed is also fitted with devices for automatically removing and replacing the cover of the vessel as it is moved to and from its place.

An improved apparatus for removing snow and ice from streets has been patented by Mr. Oscar F. Boomer, of Brooklyn, N. Y. The invention consists in laying steam pipes along the street gutters for receiving the exhaust steam from the boilers that are used for heating or mechanical purposes in the buildings bordering on the streets, or for receiving steam from other sources especially arranged for that purpose.

A combined desk and folding wardrobe bed has been patented by Mr. Ernest N. Doring, of New York city. The object of this invention is to furnish folding wardrobe beds provided with desks so constructed that they can be opened and used with as much facility as though they were only desks, and which at the same time will not interfere with the opening and closing of the wardrobe beds.

### Destruction of Fish by Torpedoes.

The alarming destruction of the fish in many of the Indiana streams by means of dynamite torpedoes, has led to the organization of a State Fish Protection Society, of which Alexander C. Jameson is president. County and local societies are to be formed throughout the State to assist in enforcing the new fish law. Unless steps are speedily taken to prosecute the vandals who are using these torpedoes so destructively in some of our streams, the fish will to a great extent disappear.

The manner in which the dynamite fisherman operates is to sink the torpedoes in the holes or deep water in the streams, and set them off with a fuse. The concussion is so great as to kill or stun all the fish within a radius of fifty feet or more, when they rise to the surface of the water. The larger ones are then scooped up in nets, and the smaller remain to rot and taint the air.

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