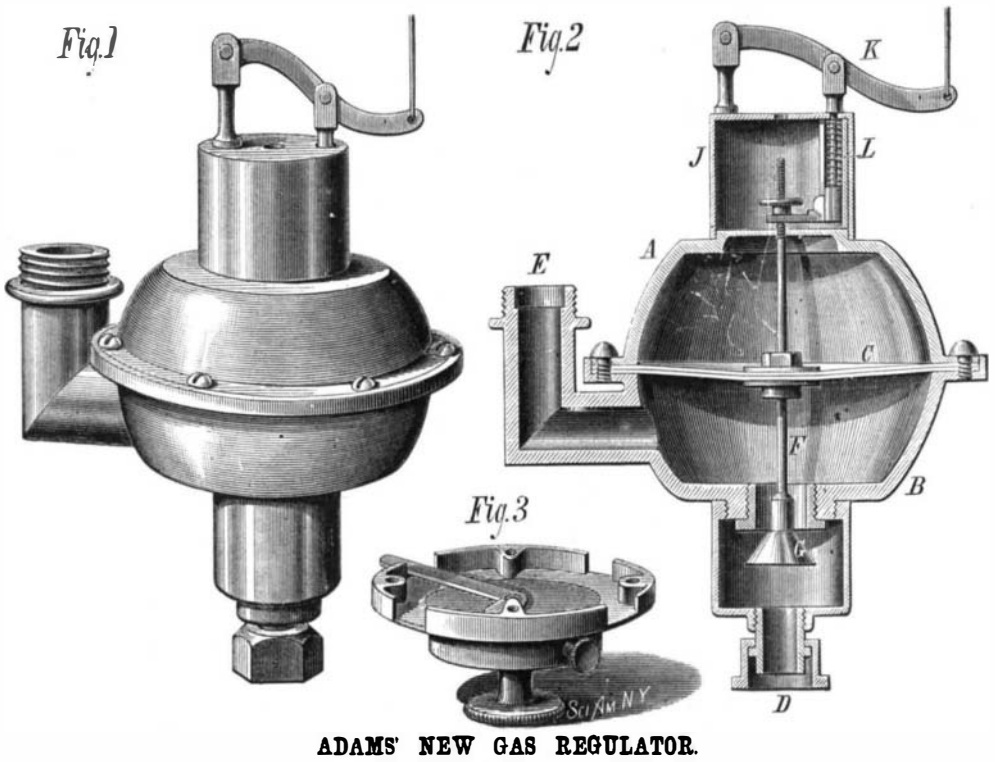
A NEW GAS REGULATOR.

The unavoidable fluctuation of gas pressure is the main if not the only objection to the use of gas as an illuminating agent. The sudden flaring up of the flame under increased pressure not only impairs the light and indicates a waste of gas, but it permits a quantity of unconsumed carbon to escape and vitiate the atmosphere of the room and endanger the health of the occupants.

The importance of avoiding the escape of unburnt carbon has not been fully recognized in this country. In Europe this subject has received considerable attention, and in many of the cities gas regulators are in general use.

We illustrate one of the most successful of these instruments, which, after the most thorough tests, has been adopted in several different departments of the United States Government, and it has been in successful use in many of the public buildings in Washington for several years.

The regulator, which is shown in perspective in Fig. 1 and in section in Fig. 2, has the usual casing composed of two hemispheres, A B, joined together by screws that pass through the flanges, between which the edges of the diaphragm, C, are tightly clamped. The lower hemisphere has an inlet, D, and an outlet, E. The diaphragm is composed of two thicknesses of pliable leather, having their adjacent faces coated with plumbago or other gas resisting medium. The coating being thus placed out of direct contact with the gas remains unaffected.



ADAMS' NEW GAS REGULATOR.

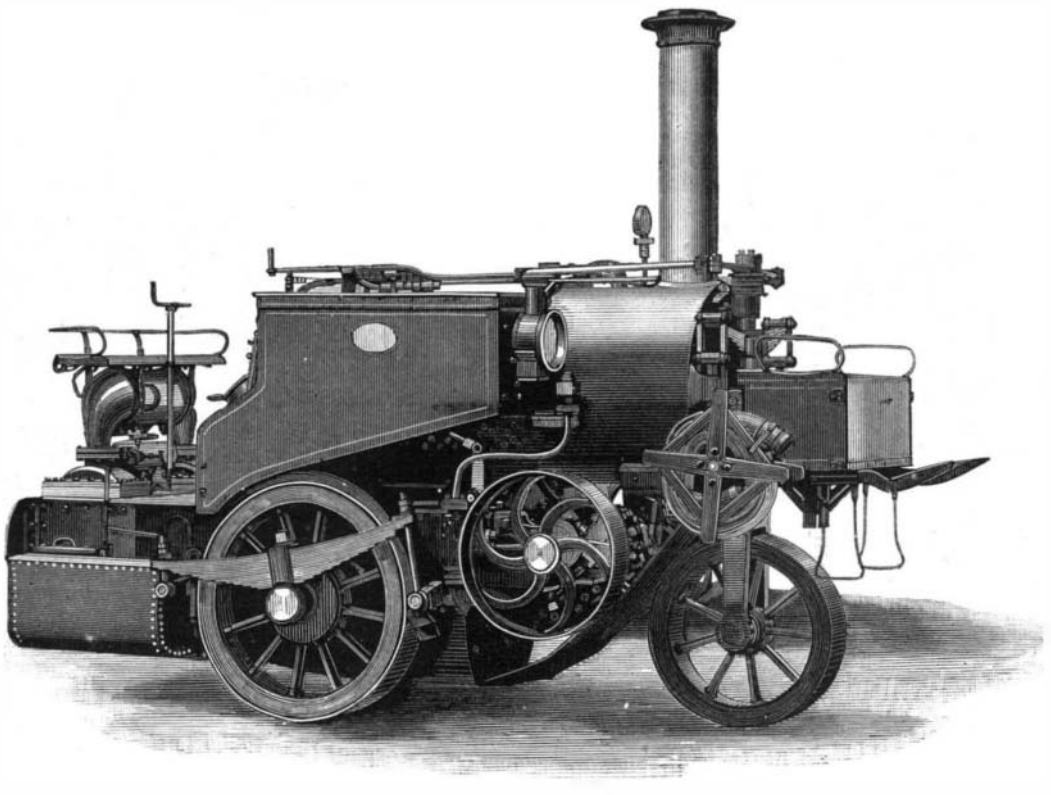
A valve stem, F, is suspended from the center of the diaphragm, and carries at its lower end a conical valve, G, which is capable of closing against the valve seat so as to entirely shut the inlet. The stem, F, rises above the diaphragm and passes through a hole in the top of the casing into a supplemental case, J. A lever arm, K, is pivoted in a standard at the top of the supplemental case, and is connected with a vertically sliding rod, L, which carries at its lower end a forked foot that embraces the valve stem, F, below the adjusting nut. The sliding rod, L, moves in a tube, and is pressed downward by a spiral spring. The lever arm, K, is connected by a wire with the knob, shown in Fig. 3, either directly or through a system of bell cranks or pulleys. By turning this knob, the regulator may be adjusted so that any desired pressure may be had in the distributing pipes; this pressure will thereafter be maintained with certainty and uniformity. Any increase in the gas pressure in the regulator raises the diaphragm, and by closing the valve diminishes the supply; a diminution of pressure produces the contrary effect.

This regulator was recently patented by Mr. Joseph Adams, through the Scientific American Patent Agency, who may be addressed for further particulars at Room 40, Corcoran Building, Washington, D. C.

COMBINED TRACTION ENGINE AND STEAM FIRE ENGINE.

A combined traction engine and steam fire engine, constructed by M. A. Schmid, of Zurich, and exhibited at the Paris Exhibition, has as a test of its lability to travel, made the journey from Zurich to Paris, a distance of about 450 miles, in eight days. The engine itself, in service, weighs six tons, and brought with it a wagon weighing about five tons, containing coals sufficient for forty and water for fifteen miles. As there were in the road over which it passed gradients of one in seven, there can be no doubt of its ability to surmount any ordinary difficulties. As will be seen from the illustration, for which we are indebted to the *Engineer*, the engine is supported on three wheels, the leading wheel being worked by a crosshead and lever bars from the foot plate. The distribution of weight is very happily chosen, and the consequent tendency to upset on uneven ground, with only three wheels, is entirely obviated by the way in which almost the entire load is thrown on the driving wheels. The cylinders have a diameter of seven inches and a stroke of ten inches, and the motion is communicated to the driving wheels by toothed gear and an endless chain. The latter can be instantly disconnected, and the engine used either as a steam fire engine capable of throwing 300 to 400 gallons per minute under a pressure of 100 lbs. to the square inch, or as a portable engine for agricultural purposes. The diameter of the driving wheels is forty inches, and of the steering wheel thirty inches; the grate surface is five square feet, and the heating surface one hundred square feet; the usual pressure of steam is 150 lbs. to the square inch.

According to the statement of those who accompanied the engine from Zurich, the journey was effected without any mishap or breakdown of any kind. The highest speed attained was fifteen miles per hour. The tires of the wheels give evidence of the nature of the road over which it passed; otherwise there was nothing about it to denote the test it had withstood. With regard to the general disposition of the moving parts, certainly no space has been lost, but the difficulty of making repairs has been proportionately increased; and although the state it is now in shows no sign of an early probability of any repair being required—excepting, of course, the renewal of packing, etc., which it has already undergone without any extraordinary removal of parts—the replacement of any damaged or worn member would undoubtedly necessitate a considerable dismounting of many members which, in an ordinary engine of this class, would neither interfere nor be interfered with. We cannot speak too highly of the workmanship, and from its performances as witnessed in the limited space within which its gyrations are confined, the favorable impression derived from its finish, compactness, and general appearance has been fully confirmed.



NEW TRACTION ENGINE.

New Mechanical Inventions.

An improvement in Vibrating Churns has been patented by Mr. Samuel Mellon, of Cameron, West Va. The object of this invention is to furnish a mechanism by which a churn may be easily operated, and to construct the operative parts in such a manner that they may be readily attached to and taken off the churn.

An improvement in Vehicle Springs has been patented by Mr. David G. Wyeth, of New Way, Ohio. This is an improvement upon the spring covered by letters patent No. 187,694, issued to the same inventor. The improved gearing has a less number of parts and also a greater compactness as a whole, so that it is lighter and cheaper than the other.

A Vehicle Wheel Hub has been patented by Mr. Daniel May, of Lumberton, N. C., which consists in a hub having mortises in the axle box for the spokes, which mortises are open at alternate sides, and collars having projections on their inner faces to enter the mortises in the axle box, so that the mortises are closed after the spokes are inserted. The collar at one side closes the openings on that side, and the openings at the opposite side are closed by the other collar.

An improvement in Trimmers for Wax-thread Sewing Machines has been patented by Messrs. Joseph I. Pellerin and Hector Pellerin, of Montreal, Quebec, Canada. The object of this invention is to provide means for applying the principle of cutting the leather simultaneously with the seaming thereof to the class of shoemakers' sewing machines which use a waxed thread.

An improved Waxing Device for Sewing Machines has been patented by Mr. Wm. S. Hadaway, of Chiltonville, Mass. This invention is intended to furnish for power-operated sewing machines an improved thread-waxing device that can be easily adjusted for differently sized threads, and that may be easily regulated for the quantity of wax to be used, so as to save a great portion of the wax hitherto wasted.

An improved Machine for Straightening Car Axles has recently been patented by Mr. Joseph A. Hodel, of Cumberland, Md. By a system of adjustable jacks and yoke with counter screw, the straightening strain is confined to the part that is already bent without affecting the other parts of the axle.

Mr. Eben Brown, of Milford, Mass., has patented an improvement in Machines for Turning Needle Blanks. This invention is to automatically regulate the action of the cutting tool upon the blank in turning machines, so that the blank will be cut to the standard gauge, and the tendency of the machine to enlarge the needle or other article produced from the blank is corrected by the act of forming such blank.

An improved Stock Car has been patented by Mr. Henry S. Moody, of Omaha, Neb. The object of this improvement is to protect cattle from bodily injuries, to allay fever, and to counteract the effects of heat, thirst, and exhaustion, from which the animals so severely suffer as the result of the present mode of transit in railway cars. This improvement secures to the consignor the full normal weight, and the consumer the benefit of meat in a prime and healthy state.

VAN RENNES' CALORIC ENGINE AND PUMP.

As a motor of small size for use in the trades, a new construction of hot air engine and pump has recently been brought out by Mr. D. W. Van Rennes, of Utrecht, Holland, which has quickly found favor, owing to its simplicity and low running expenses.

This motor is represented in our illustrations, in which Fig. 1 shows a motor of the smallest size, heated by a gas flame; Fig. 2, one for four horse power; and Fig. 3, a vertical section of a motor connected with a so-called caloric pump.

On a solid bed frame of suitable size is supported a closed cylinder, T. At the inside of the cylinder is a large piston, X, whose rod, *e'*, passes through a stuffing box, *e*, to the outside. Between the piston, X, and the walls of the cylinder, T, is left a small communicating space. The upper part of the cylinder, T, is surrounded by a funnel shaped jacket, *t*, which is partly filled with water for the purpose of cooling, while the lower end of the cylinder is heated up by a gas flame, and in larger engines by a coal or coke fire. The temperature of the air at the inside of the cylinder becomes by the heat of the fire higher at the lower than at the upper part of the same. The heated air ascends in the space around the piston to the upper part, and passes through a pipe projecting from the cover and through a rubber tube to a small copper cylinder, *p*, which oscillates on a pillar, D, and is open at the bottom. The pressure of the air forces the piston, *a'*, of the small cylinder, *p*, forward, and moves simultaneously the piston of the stationary cylinder downward. As the piston rod, *e'*, of the large piston is connected by a walking beam and crank rod with the crank shaft of a flywheel, and also the piston of the oscillating cylinder by a piston rod with a second crank of the flywheel shaft, it is obvious that the two rectilinear motions of the pistons produce the rotary motion of the crank shaft. As soon as the pistons, X and *a'*, have arrived at their terminal points, the cooling water jacket begins to exert its influence. The cooling off of the air above the pistons, X and *a'*, produces a partial vacuum, which, in connection with the direct pressure of the atmosphere on the bottom of the piston, *a'*, lifts the piston, *a'*, and returns simultaneously the piston, X, into its former position. The alternate raising and lowering of the pistons produced by the continuous heating up of the large cylinder, produce a continuous rotary motion, which may be utilized.

The caloric pump has in its working some similarity with the "Pulsometer," only that heated air effects here what steam accomplishes in the other. As in the caloric engine the cylinder, *p*, is connected with the main cylinder, so in the pump a cylindrical vessel is connected by a pipe, *r*, with the cylinder, T. A suction pipe leads therefrom into a water reservoir below, while a force pipe, C, runs from the top to the place to which the water is to be conducted. The mouths of both pipes are closed by valves, *n* and *o*, which open upwards. The heated air passes through the opening, *m*, into the cylindrical vessel, and into pipe, *c*, closing the valve, *o*, and opening the valve, *n*. As soon as the air is cooled off by the cold water jacket, the atmospheric pressure closes the valve, *n*, while a partial vacuum is formed above valve, *o*. This in connection with the air in the suction pipe causes the opening of the valve, *o*, and, by the partial vacuum created in the suction pipe, the lifting of the water from the reservoir. The next supply of heated air cannot escape through the pipe, *c*, as the lower end of the same is closed by the water; it therefore exerts a pressure thereon sufficient to force it up and out through valve, *n*. As soon as the pump is in motion, a continuous current of water, but no air, is forced through valve, *n*, so that by the action of the fire below the cylinder, T, the alternate heating and cooling of the inclosed air, and thereby the continuous raising of the water, are produced. One of these pumps is at work in a factory near Amsterdam, where it lifts per minute 28½ gallons of water to a height of 18 feet, and works to the great satisfaction of the owners.

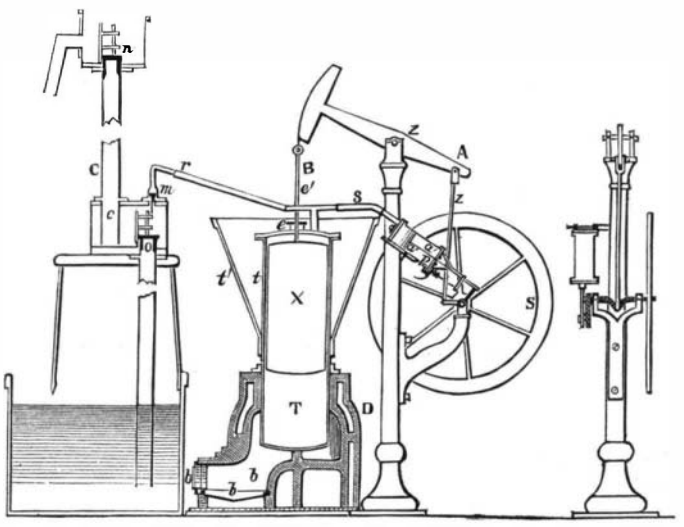


Fig. 3.—VERTICAL SECTION OF ENGINE AND PUMP.

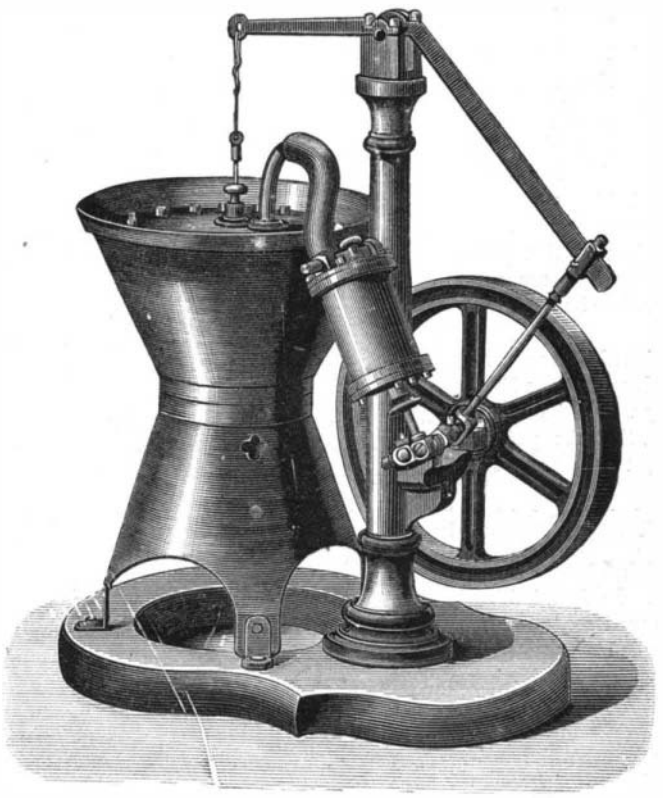


Fig. 1.—SMALL CALORIC MOTOR.

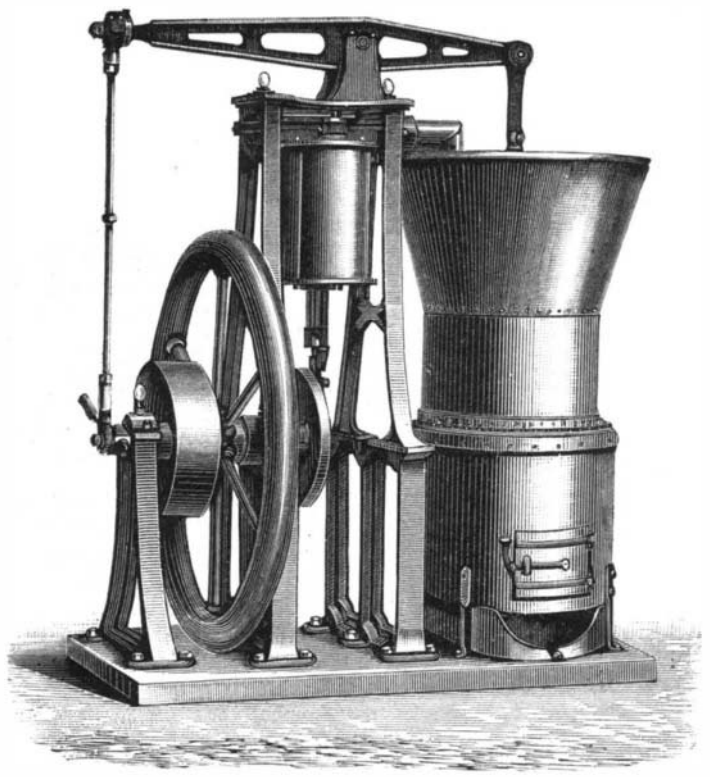


Fig. 2.—FOUR HORSE POWER CALORIC ENGINE.

Building in Steel.

In their final report the Committee of the British Association on the use of steel for structural purposes, states "that the employment of steel in engineering structures should be authorized by the Board of Trade under the following conditions, namely: 1. That the steel employed should be cast steel, or steel made by some process of fusion, subsequently rolled or hammered, and that it should be of a quality possessing considerable toughness and ductility, and that a certificate to the effect that the steel is of this description and quality should be forwarded to the Board of Trade by the engineer responsible for the structure.

"2. That the greatest load which can be brought upon the bridge or structure, added to the weight of the superstructure, should not produce a greater strain in any part than 6½ tons per square inch. In conclusion, we have to remark that in recommending a coefficient of 6½ tons per square inch for the employment of steel in railway structures generally, we are aware that cases may and probably will arise when it will be proposed to use steel of special make and still greater tenacity, and when a higher coefficient might be permissible, but we think those cases must be left for consideration when they arise, and that a higher coefficient may then be allowed in those instances where the reasons given appear to the Board of Trade to justify it."

This report has since been acted upon by the Board of Trade in the printed paper issued by them in reference to railway structures. "It will be observed," they say, "that a coefficient of 6½ tons per square inch is assigned to steel, that of iron being 6 tons per square inch. This increase of the coefficient will effect important economy in structures, especially in bridges of large spans, and will also tend generally to increase the employment of steel for railway and ship building purposes."

This measure seems to have been designed in the special interest of steel manufacturers as opposed to iron manufacturers, to secure to them advantages which would not naturally accrue to them, else we think a higher coefficient, a greater difference in strength and resisting force, as compared with iron, would have been demanded of the steel.

New Inventions.

Mr. Martin Bock, of Hughesville (Drum's P. O.), Pa., has patented an improved Clock Case, in which a time movement, a striking movement, and an alarm movement are carried in and by a single frame, and inclosed in a case of neat appearance and of compact form and size; provision is made for operating and regulating the various parts from the exterior of the case; a cheap, substantial, and serviceable clock is produced, and several advantages are obtained.

An improved Annealing Furnace has been patented by Mr. Edwin H. Hill, of Worcester, Mass. This invention relates to an apparatus for annealing and spooling wire at one operation, while it is more particularly intended for wire used on reaping machines; it is also applicable to other descriptions of wire.

Mr. Ferdinand Diescher, of New York city, has patented an improved device for attachment to a bedstead to prevent children from falling out of bed. The invention consists in a number of strips of wood jointed together at their upper ends and having the lower ends spread out fan-like, and attached to the bedstead by means of a socket that receives the middle strip.

Mr. Philip Listeman, of Collinsville, Ill., has patented an improved Gate, which is so constructed that it may be conveniently opened and closed by a person on horseback or in a vehicle. It is simple in construction and easily operated.

An improved Post Hole Digger has been patented by Mr. Charlton Patterson, of Rock Island, Ill. This invention consists in the combination, with the digging bucket, of an annular piston and central piston rod, operated by a connecting rod and lever, the latter being pivoted to the hollow handle of the post hole digger.

Morris Jacobs, of Fort Clark, Texas, has patented an improved Padlock which cannot be unlocked by a key, in the ordinary manner, without a preliminary and peculiar manipulation in order to place the tumblers or locking bolt in the required position for contact with the bit of the key. The body of the padlock is made in two separate parts, the one being pivoted to the other, and capable of rotation (when released by spring catches) to change the position of the tumbler and bolt with reference to the key hole.

Mr. Seth Kethledge, of Center Point, Iowa, has patented an improved Lumber Measure, in which the motion of the spur wheel or toothed disks is transmitted to an indicator which has a reciprocating rectilinear motion longitudinally of the carrying frame or case. No adjustment is required for the purpose of measuring boards of different widths. Instead of a circular dial there is a scale marked with figures arranged in columns extending longitudinally on the surface of the carrying frame or case, and a separate column is provided for each of the different standard lengths of lumber.

An improvement in Rotary Engines and Pumps has been patented by Messrs. Walter E. Bartrum and Henry C. Powell, of London, England. This invention relates to rotary apparatus that may be employed as an engine worked by steam or other fluid under pressure, or as a pump for raising or forcing fluids, or as a liquid or fluid meter.

Mr. Frederick K. Collins, of Butler, Ind., has devised an