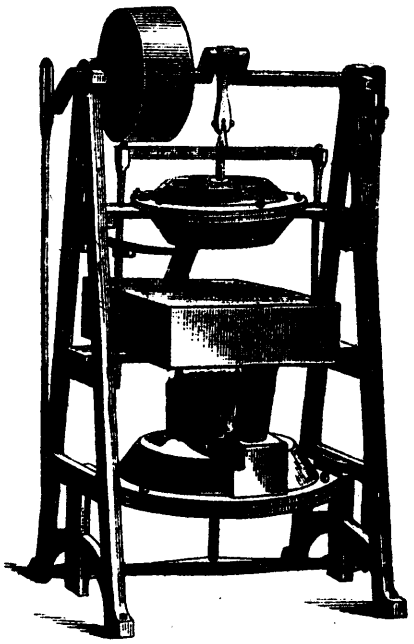
TOM THUMB HOT-AIR ENGINE.

One of the great wants of the day is a motor for small machinery, which shall avoid the danger and inconvenience of steam. This is accomplished in the Tom Thumb caloric engine, recently patented, which makes use of the expansive force of heated air alone. Its success is based on employing a comparatively low temperature—250° to 300° Fah.—producing a pressure of four to five pounds per square inch, and operating on a broad diaphragm piston of relatively short stroke. The piston is formed of two circular metallic discs, having between them a flexible diaphragm composed of a layer of vulcanised gum elastic sheet, and over this externally a layer of canvas, which protects the gum and prevents it from yielding to pressure. A clamp ring attaches this diaphragm air-tight to the rim of a dish-shaped vessel, so as to allow of a motion in the piston to the extent of about one-third its diameter. This is the working cylinder, from which, it may be observed, the boring and fitting, as well as friction incident to the ordinary arrangement, are quite eliminated. The piston box forms the upper member of the machine, the connection of piston and crank being apparent in the engine. The central part, the heater, is a tight metallic box, the interior heating surface of which is greatly increased by numerous thin plates or ribs cast in connection with the bottom and rising almost to the top nearly the whole length. The heat being applied to the bottom of the box, the lower edges of these ribs are virtually in the fire, and thus the whole are readily kept at a suitable temperature.



At the bottom is another piston box similar to the first, but larger, and having its piston below, with a valve in it opening inward. This is the air pump, and it is connected with one end of the heater by a pipe which has an automatic valve at the lower end, opening upwards. As this piston descends it fills the box with air, which in ascending is forced into the heater, and the valve in the pipe prevents its return. The other end of the heater is connected with the upper piston box or motor by a pipe always open, the two thus forming one chamber.

The operation of the machine is thus: The heater being filled with expanding air, the motor piston is forced upward, and just before it reaches the highest point a tappet on one of the cross-head guides raises a lever, pivoted on the outer frame, which lever in rising forces upon a valve in the bottom of the motor box, opening a communication with the outer air, and consequently the pressure subsides, allowing the piston to descend. Soon after the main crank passes the top centre two long cranks on the ends of the shaft, connected with the crosshead of the lower piston by slotted rods, suddenly collapse the air-pump, blowing out the hot air from the heater and motor box through the now open valve in the bottom of the latter, and supplying its place with fresh cold air. The latter motor piston now descending presses and closes the latter valve, and the fresh air is confined between it and the valve below the heater, to be at once expanded for another stroke. The action of the air-pump not being against any pressure, little power is consumed in it. Like other caloric engines, it is single-acting, and the pulley serves also for a flywheel. The internal capacities of the air-pump and heater are equal, and about three times that of the motor vessel. This is important in order to obtain sufficient pressure at a temperature so low as not to injure the motor diaphragm—the gum being vulcanised to bear about 300° Fah. The simplicity and cheapness of construction of this machine will recommend it for a great variety of purposes. An engine suitable to propel a sewing-machine is about twenty-five inches high by thirteen wide, and heated by an oil or gas stove. An engine forty-five inches high is a quarter horse-power, while the full horse-power is six feet high by three feet wide. For further information address J. Jenkins, No. 3 South Tenth street, Philadelphia, Pa.

EARTHQUAKES.—Prof. Palmieri, of Rome, has been lecturing recently on the possibility of foretelling earthquakes, and has expressed the belief that they will yet be foretold about three days in advance of their occurrence. If they can be anticipated in season, a great saving of life and property will be ensured. We are mainly so free from these convulsions of nature in this country that we hardly realize how very calamitous they have and continue to be in other quarters of the globe. It is estimated that 12 or 13 earthquakes, more or less destructive, take place annually; and it has been acertained that the surface of the earth is never free from sensible evidence of constantly active earthquake agencies. No land entirely escapes; but volcanic districts are the most frequent sufferers. Beginning with these, they have been known to pass beneath sea and land from one hemisphere to another until one-eight of the entire surface of the world has been disturbed. In the city of Antioch, (Syria,) 250,000 persons are said to have been killed in 526, a crowd of strangers having been present at the festival of the Ascension. This was the most terrible earthquake on record. In the great Lisbon earthquake (1755,) 60,000 people perished in six minutes. The rumbling subterranean sound was immediately followed by the shock, which threw down the principal portion of the city. The sea retired and returned in a wave 50 feet high. The adjacent mountains were so violently shaken as to be rent and hurled in fragments into the valleys below. Thousands of persons fled from the falling buildings to the marble quay, just finished at great expense, when the quay suddenly sank; the waters closed over it; boats, vessels, and human beings were drawn into the whirlpool, and not one of the bodies rose to the surface. Over the spot the sea stood 600 feet deep, burying the greater portion of the life and wealth of the capital. The extent of the surface of the earth shaken by the agitation was four times greater than the whole of Europe. In Calabria, at the end of the last century, 40,600 lives were swallowed up by an earthquake. As many as 13,000,000 of human beings have, it is calculated, been lost by such convulsions. Egypt has probaby been less visited by them than any other country, but a serious earthquake took place there in 1740, and Holland, notwithstanding its loose alluvial soil, has felt their influence. The earthquake at New Madrid, Mo., (1811,) is the most important known in this republic. That was one of the few examples of the incessant quaking of the ground, far from any volcano, for several successive months. For 300 miles, from the mouth of the Ohio to that of the St. Francis, the ground rose and sank in vast undulations; lakes were formed and drained; the surface burst open in fissures, from which mud and water were thrown to the height of 60 or 70 feet. All theories as to the cause of earthquakes agree about the connection between them and volcanoes. The existence of a molten fluid mass in the centre o 'he earth is generally conceded; hence the generation of immense quantities of elastic gases from such a vast source of heat would naturally produce explosive force enough to create earthquakes. The latest, and perhaps the most satisfactory theory, has been put forward by the Rogers brothers, who regard the direct cause of earthquakes as the actual pulsations of the fluid beneath the crust of the earth, propagated like great waves of translation from prodigious ruptures, produced by tension of elastic matter, and floating forward on its surface the superimposed rocky crust of the globe. This theory harmonizes with the phenomena of earthquakes, and is remarkably confirmed by the structure of many mountain ranges.—*New York Times.*