

A WEIGHT POWER TO DRIVE FANS, ETC.

The illustration represents a device of simple construction designed to be utilized in driving fans, sewing machines, small pumps, and other light machinery. It has been patented by Mr. Louis Dedel, of No. 245 Josephine Street, New Orleans, La. In the casing, A, is supported a drum, C, on a shaft, D, the shaft being connected with the drum by a ratchet mechanism, the ratchet wheel being engaged by a spring-pressed pawl when the drum turns in one direction, while the pawl passes over the teeth of the ratchet when the drum turns in the opposite direction. On the drum is wound a rope, F, extending up over a series of pulleys, G, on the ceiling, H, there being hung on the rope between adjacent pulleys a series of weights, I, the last of which, I³, is attached to the free end of the rope. The weights slide along suitable guideways, J, extending from the ceiling to the floor, and increase in size and weight in such manner that the last weight is sufficiently heavy to hold the other three weights in an uppermost position, the third weight in like manner holding up the other two, and the second weight holding up the first, each, however, developing surplus power to actuate the drum. A series of gear wheels, K, connected with the drum shaft, actuate shaft, L, extending to the outside of the casing, this shaft carrying a pulley connected by a belt with the mechanism to be driven, in the illustration represented by a fan. On the outer end of the hub of the drum is a crank arm, C², to wind up the rope of the drum, by which all the weights are raised to an uppermost position, the drum shaft then remaining motionless as the pawl glides backward over the ratchet teeth. By using an additional set of weights, with proper connections, this power may be made to operate without interruption, one set of weights being wound up as the other runs down.

Detection of Paraffin in Beeswax.

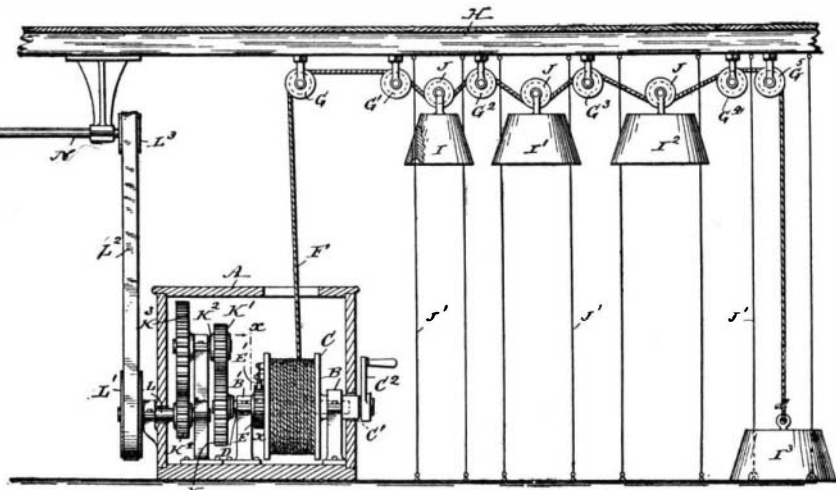
A few grammes of the substance in fine air-dried shavings are gradually heated in a small porcelain capsule until fumes begin to rise. A half-liter wide-mouthed bottle is then inverted upon the capsule, and when filled with white vapors is closed and set aside until the fumes have condensed upon its walls. The sublimate is then dissolved in 3 c. c. of chloroform, the chloroform evaporated in a test tube, and the residue boiled with 4 c. c. of soda solution. If paraffin was present, it will, after cooling, be found floating on the clear solution. A drop of the chloroform solution may also be evaporated on a slip of glass and examined microscopically.

The fumes from pure bees-

wax are not so white as from paraffin, and are only obtained at a higher temperature (300°-320°). The sublimate gives a colored solution with chloroform and a colored and turbid solution with soda. The residue from the chloroform solution is a dull film;

1,300 feet long. It is made in sections 30 feet long, or just the length of a rail. Two drilled wells supply the water, which is pumped from water vaults or cisterns over the wells into elevated tanks by the side of the track. The tanks, of 35,000 gallons capacity each, are fed by two Blake pumps. From the tanks pipes are carried down to the ground and underground to the track trough, entering it as shown in one of the cuts. There are four feeds for each trough. Part of the connections are of leather, to prevent breakage by jarring. Each opening in the bottom of the trough is 3 by 8 inches. The first pipe from the tanks is 12 inches in diameter. To this two 8 inch pipes are connected, which run both ways for several hundred feet, eventually reducing to 4 inches in diameter. When fully charged, 5 inches depth of water are run into the troughs.

A dipper or movable chute is carried by the locomotive tender. It is arranged so as to be raised or lowered at will by a lever. The general construction is shown in



DEDEL'S WEIGHT POWER.

paraffin, on the contrary, gives separate grains in a clear field.

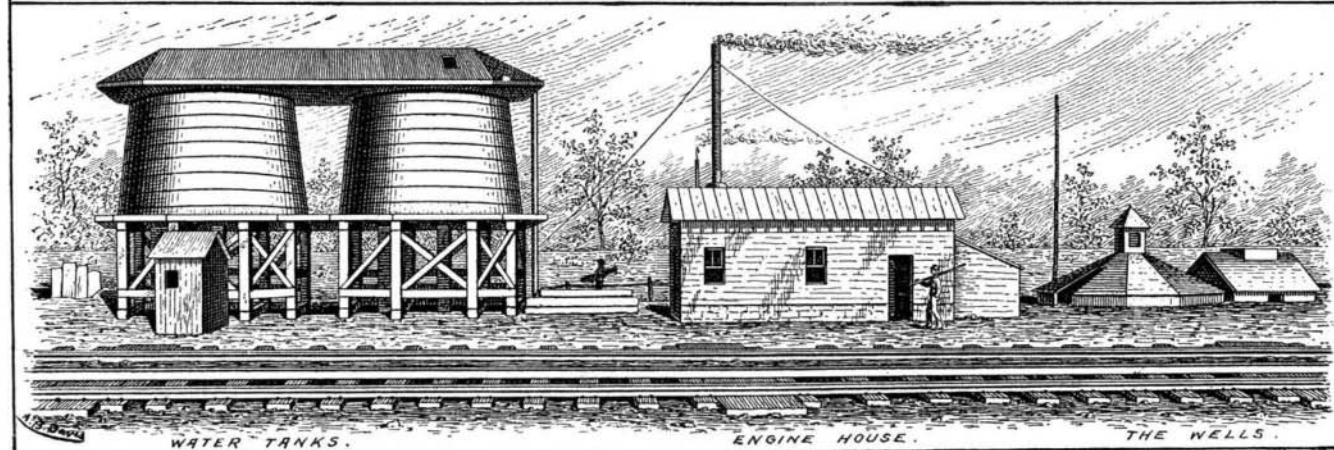
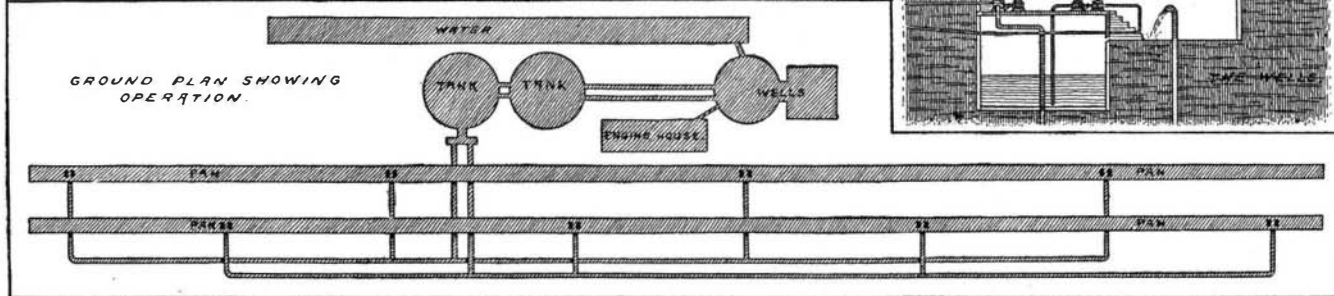
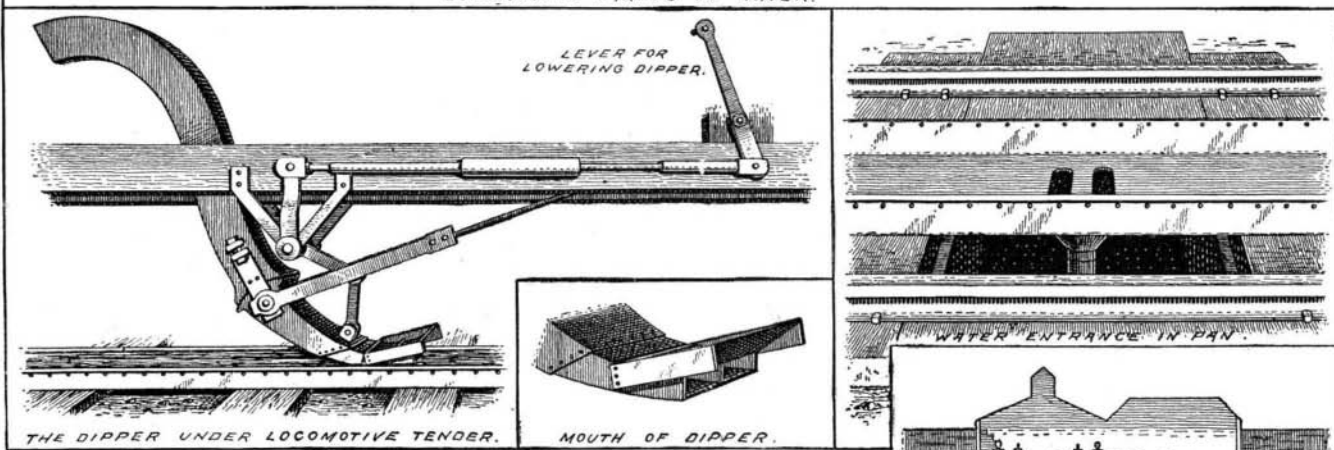
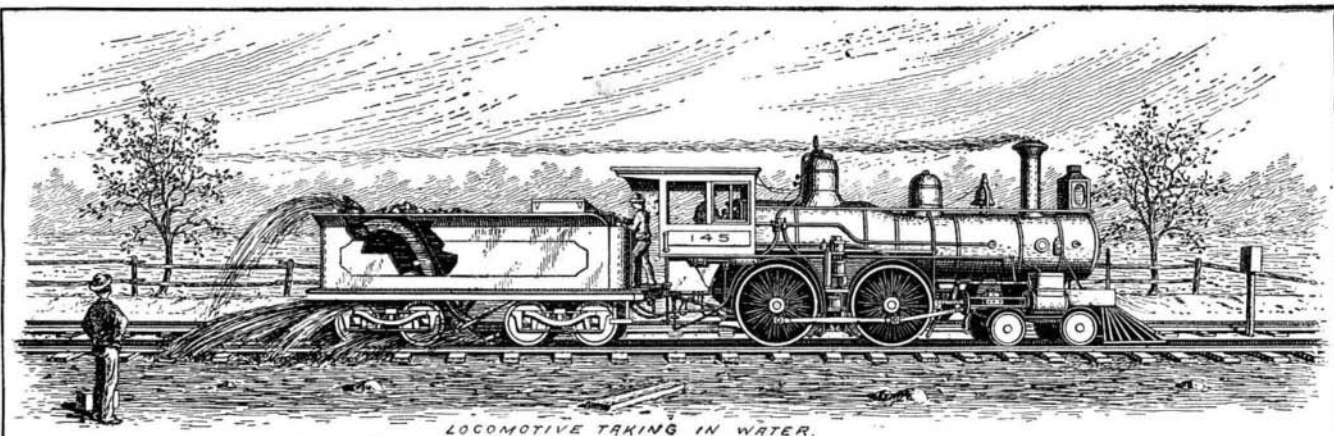
SUPPLYING MOVING TRAINS WITH WATER.

The system of taking water into locomotive tender water tanks without stopping the train has been quite extensively introduced upon some of the leading railroads of this country. A good example is now in operation upon the Pennsylvania Railroad about one mile east of Rahway, N. J. An iron trough is laid upon the sleepers. It is 6 inches deep, 18 inches wide, and about

the cut. When lowered, it descends to within about one inch of the bottom of the water trough. From the mouth of the dipper a rectangular pipe rises into the water tank of the tender. At its upper end this pipe is one foot square. The range of vertical movement of the dipper is about eight inches. Its mouth is three and one-half inches high, and corresponds closely in width with the interior of the trough. It is made of copper, so that if it strikes anything it will bend and not break, and can be easily straightened out again. A wing or blade extends over the top of the mouth, to

prevent water being thrown over and out of it.

To take in water the fireman lowers the dipper. As it meets the water in the tank, the latter is forced up in great volumes into the tender tank. From one trough two thousand two hundred gallons can be taken in on passing. A watering station is installed about every forty miles. Thus an engine can run continuously as far as the coal can carry it on a road supplied with these appliances.



Survey of the Pacific Coast.

After nineteen years the United States steamer Hassler has completed the survey of the California and Oregon coasts. The Hassler was built specially for this work in 1871, and on her maiden trip around Cape Horn, Professor Agassiz made a series of deep-sea dredgings along the coast of North and South America, with valuable results to science. The most interesting fact developed in the recent surveys is that the coast line of Southern California is more abrupt than that of any part of the Atlantic or other portion of the Pacific.

Electricity in Warfare.

Some interesting experiments have been made in the estuary of the Mersey to test the efficacy of submarine mines as defenses of the approaches to the port of Liverpool. For some days the Mersey Volunteer Division R. E., Major Montgomery commanding, devoted themselves to laying down "mines" in different spots, and the major, with a large party of officers and others interested, proceeded out in the war office steamer Lady Heathfield to see how these mines could be electrically exploded and note the effects. One mine (an iron box containing 100 pounds of gun cotton) had been laid at a depth of 15 feet of water off rocks known as the "Red Noses," and was electrically connected with Perch Rock Battery, as well as with a buoy 200 yards out in the stream. The steamer struck against this buoy, an electric bell immediately rang in the battery, and the mine was fired. This seemed to be practically instantaneous, and the result was that a rudely constructed raft placed over the mine was hurled up in fragments to a great height, with a vast volume of water. It was easy to see what would have been the fate of a ship placed in the position of the raft, especially if the iron box had contained a full charge of 500 pounds of gun cotton. Lesser mines were laid with relatively equal effects. A hundred mines are laid in the Mersey as port defenses.

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The Mammoth Cave of Indiana.
 BY H. C. HOVEY.

Rummaging lately among the rare and curious books in the library of Colonel Durrett, I found proof that while Gen. W. H. Harrison was territorial governor he visited, in 1806, a remarkable excavation which he styled "The Mammoth Cave of Indiana." Later in the same year was discovered its famous and only rival, "The Mammoth Cave of Kentucky." But the Hoosier cave has plainly the prior right to the unique title, only it is now too late to make the assertion except as a matter of curious interest. The earliest published account appears in Martin's "Sketches of Louisville and its Environs" (1819), under the heading "The Mammoth Cave of Indiana." In Flint's Geography (1831), it is called the "Epsom Salts Cave," and in legal enactments in 1843 it is designated "The Indiana Saltpeter Cave," a name now given to a smaller cave near by. The name "Wyandot Cave" does not seem to have been adopted until about 1848, being taken from the adjacent Wyandot River, now known as the Blue River. At an early day the ground was pre-empted by Dr. B. Adams, who had saltpeter works here from 1812 to 1819, when, by his failure to pay the purchase money, it reverted to the United States. It was bought in 1820 by Mr. Henry P. Rothrock, who at a later date perfected his title, and by whose will it becomes, under certain conditions, the heritage of Mr. Frank Rothrock, his favorite grandson.

Frank Rothrock, with a commendable desire to know as much as possible about his prospective domain, recently organized an exploring party, including with himself three other sturdy lads named Ben Hains, Henry McClintick and Ira Rainbolt. What they style, in their narration placed at my disposal, "the unexplored regions," are not properly such, having been visited in 1860 by Messrs. Andrew and Washington Rothrock, together with two men named Miller and Langsdale. Miller gave out at a place called for that reason Miller's Reach. Andrew stopped at a spot known as Andrew's Retreat. Washington Rothrock and Mr. Langsdale went as far as Langsdale's Basin. But such are the difficulties and perils of the labyrinth that no one has ventured there since, until now, nor has any previous description of the region been published.

The general plan of the cave resembles a gigantic letter K, including the main cave and the north and south arms. Twelve hours are required to traverse the sixteen miles ordinarily on exhibition. The so-called "unexplored regions" cover at least seven miles additional. They are entered from a place called the Ice House, because the gypsum-coated blocks of limestone resemble so many masses of ice. This is near the termination of the northern arm. The boys dived under a ledge but two feet above the floor, and burrowed through what resembled a great snow bank, though really a mass of sparkling crystals. In fifteen minutes they came to the Round Room, out from which ran several short branches, each ending in a mud bank. But through an orifice eight feet overhead, they entered a sort of second story, or in other words a cross cave. For it should be understood that Wyandot Cave, instead of being a single excavation, is made up of numerous different caverns connected with each other by large or small openings. Going northward over cliffs, through crevices, and sliding along sharp ridges, the boys halted on the edge of a pit, which they contrived to cross by a kind of natural bridge, and went 300 yards further, finding many oolopholites and other ornate forms of alabaster. In a circular room, 10 feet high and 60 wide, were remarkably fine helictites, as well as straight stalactites. Their explorations in this direction came to an end at a deep pit, beyond which it seemed impossible for them to go

without appliances with which they were not furnished at the time.

On a subsequent trip they took along a rude ladder made from a cedar tree, the trunk of which was about three inches in diameter, the boughs being cut at a convenient length for climbing. This they dragged in by a rope as far as the Round Room, and used it as an easy means of gaining the "second story," where they left it with one end sticking through the hole in the floor, to play an important part in their subsequent adventures.

Wriggling through an orifice, yet above them, and through narrow crevices in a rocky pile, they emerged into still a third story above the Round Room, where the floor sloped up to the roof on every side. Thence, pursuing a remarkable winding passage, about five feet wide, twenty-five feet high, and a mile long, the walls of which were coated with pure white alabaster, they came to a modification of the labyrinth, a section of which would resemble an hour glass. They were now directly under the main cave. Shortly they came to a long, sharp-edged rock, filling entirely the passage for fifty feet, along which they had to stride as if on horseback. This was "Rode Rock, No. 1." Then there was good walking for 200 yards, that took them to a small orifice opening into yet another cross cave, called the Wild Cat Avenue, a large, low room, with a very muddy floor, on perhaps as low a level as any other spot in the whole cave. Beyond it is Maggie's Grotto, about thirty feet wide. From this they made their way again into the main avenue they had left for this transverse cave, and which bears the name of the Little Giant Avenue.

And now they met with a novel difficulty, for the floor was cut by a series of pits that could be crossed only by bracing themselves against the opposite walls. Coming to a pit too wide to be managed in this way, the boys climbed to the top of the passage, and striding the chasm for half an hour, they finally descended from a rocky shelf to a beautiful stream flowing between snowy banks, called the Marble Rivulet. Along its banks grew many spongoidal forms, with slender necks, but that the explorers found too tough to be broken off by anything at hand. Ascending the Marble Hill they enjoyed a smooth sandy floor for 600 feet, where they walked between creamy walls, curving in and out in rounded lines. Then came a tiresome crawl, varied occasionally by the cavern's suddenly folding in upon itself in such a manner as to compel the poor boys to lie sideways and drag themselves around the sharpest kind of "devil's elbows," as they called them. Striding Rode Rock, No. 2, they came to Langsdale's Basin, a small pool in a room ten feet in diameter. This pool is very shallow and its bottom covered with a fine yellow sediment. Imagine their emotions on seeing written there by the finger, and seeming as fresh as if inscribed yesterday, the names of Rothrock and Langsdale, written in 1860, long before those now gazing on the inscriptions were born. What a proof of absolutely unchanged conditions for a whole generation! Of course the boys wrote their own names alongside to await the advent of future visitors.

By an opening through the left hand wall, and down a steep clay bank, they next entered a spacious cave, distinct from those they had been exploring. Taking its right hand branch, they crawled over a floor resembling frozen waves coated with bluish slime, while the roof, instead of rock, was crumbling clay, by which they feared that they might be buried alive unless they were careful. On reaching a cross trench whose slimy walls threatened to allow no escape for those who should get within their grasp, they were disgusted, and turned back, although tempted to search for the locality of an invisible cascade whose mournful music filled the air.

By this time it was one o'clock A. M., the stock of candles was getting low, and the boys were weary. They had made so many crooks and turns as to overtax their memory, and they decided to go out as rapidly as possible. They made a few mistakes that were easily rectified, and all went smoothly enough until, beyond the Marble Rivulet, they began to work their tedious way through the top of the great hour glass crevice already referred to, supporting themselves by their elbows and knees. They thought themselves near Maggie's Grotto, and spent an hour and a half hunting the opening into it, not aware that they had really passed far above and beyond it. On they went painfully and by a most dangerous path, if a way could be called a path where their feet never touched ground for 400 yards. Presently the passage shrank to a width of six inches, and they could neither go forward nor backward nor upward. Accordingly they tried going downward, with the terrible certainty, however, that, in their exhausted condition, they could never climb up again. Plainly they were lost, and that in a part of the cave where no mortal had ever been before, and where no rescue party would ever find them. The walls closed in so fast around them that in their frantic efforts to descend the rift their coats were torn from their backs. Reaching at length a hard clay floor, they soon entered a low room, the floor of which was stone. Still impressed

that their way of deliverance lay through some upward passage, they tested every opening, but in vain. At four A. M. the boys had but one candle apiece, and were many miles from the safe outer world. Round and round they went, examining the walls of their prison house. Finally, in sheer desperation, they tried a pit that led them down to a lower room, from whose floor protruded, to their great surprise, the tip of their cedar ladder. They were in the "second story" of the round room, and two miles nearer the mouth of the cave than they had thought. In five minutes more they were creeping through to the Ice House, whence, husbanding their candles, they hurried down the Northern Arm, and emerged from the cave at 6 A. M., just in time for an early breakfast, for which their long fast gave them a keen appetite. Like brave explorers they announce their intention of taking the same trip again, with a better equipment, rope ladders, plenty of food, and a large supply of candles, in hope of reaching regions far beyond those already visited.

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SOME MEASUREMENTS IN THE MAMMOTH CAVE OF INDIANA.

BY H. C. HOVEY.

The localities named will all be found on the map as published by the Indiana State Geological Survey, tenth annual report, but the distances will be found quite different. I am indebted for them to my friend and able assistant, Mr. Ben Hains, of New Albany, Ind., who vouches for their accuracy. The measure-



R. D. Seaman N. Y.

ments as given are all from the entrance to the points named.

To the Standing Rocks.....	440	feet.
" Scuttle.....	750	"
" Cut-off.....	1,000	"
" Wolf's Lair, through the Cut-off.....	1,600	"
" Delta Island.....	1,450	"
" Foot of the Hill Difficulty.....	2,000	"
" Auger Hole.....	2,400	"
" Slippery Hill.....	2,700	"
" Crawfish Spring.....	4	miles.
" Pillar of the Constitution, about.....	2 1/2	"

Total combined length of all exhibited portions of the cave, fully nine honest miles—commonly called sixteen miles. This does not include what are styled the unexplored regions, supposed to be about seven miles more, making a grand total of sixteen actual miles of cavern passageway.

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Asbestos Manufacturers Consolidate.

The H. W. Johns Manufacturing Company and the Chalmers-Spence Company, New York; the Asbestos Packing Company and Chas. W. Trainer & Company, Boston; and the Shields & Brown Company of Chicago—the five largest asbestos manufacturers in the United States—have formed a corporation under the name of the H. W. Johns Manufacturing Company. They will control most of the output in their line of business. The officers of all the companies and their chief employes will remain with the new concern, which will thus have the advantages of their combined skill and experience. H. W. Johns is the president; R. H. Martin, formerly president of the Chalmers-Spence Company, the new vice-president; C. H. Patrick, treasurer, and G. P. Erhard, secretary; both of the last two named having previously been with the H. W. Johns Manufacturing Company.

The consolidation, which was effected July 1st, was made, it is stated, to reduce the cost of asbestos manufacture and to save other expenses. The company promise to give their customers the benefit of the economy which will thus be practiced.