tion of devices intermediate between the stay and the harness or heddles, the object of which is to throw up the worsted or loop forming thread to the right and left alternately over and above the cotton warp threads. The devices require diagrams to be understood.

Preparing and Spinning Hemp.—Patentees, Joseph C. Todd and Philip Rafferty, of Paterson, N. J.—This invention relates to improvements in machinery for effecting three different operations required to be used in preparing and spinning hemp or other fibrous materials used for the manufacture of rope. These machines are an improved lapper or heckling machine, improved drawing rollers and endless belts or aprons of leather in place of the drawing rollers.

Apparatus for Warming Buildings by Steam.—Patentees, Lewis W. Leeds and Calvert Vaux, of New York.—Steam from a steam boiler is introduced into a vessel of water so as to warm the water; and through this vessel the air pipes pass by which means air is heated, when it is distributed in the usual manner over the building. Or the steam is used directly to warm the air chamber without the intervention of water. The patent also covers a regulator for regulating the heat automatically.

Printing Blocks.—Patentee, T. Crossley, of Bridgeport, Conn.—This invention consists in the production of an electrotype printing block, having a plain face, with margins of metal, and the body of felt or its equivalent, and highly raised above its base, and having perpendicular sides. The blocks are for printing calico, &c.

Nippers for Attaching Blocks and Tuckles to Ropes.—Patentees, William H. Allen and Andrew J. Bentley, both of New York.—A pair of nippers, with jaws bent on one side and fashioned to grasp a rope, are made with eyes in the ends of the handles for the supporting cord or rope to pass through, so that the greater the weight on the block or tackle the more firmly will the rope be grasped by the nippers.

Mode of Attaching Tools to Handles.—James E. Emerson, patentee, of Trenton, N. J.—A stirrup is secured to the pick or other tool, the stirrup having a socket to receive the handle. This forms a very neat and substantial tool, and we are happy to know that it is meeting with extensive sale, as applied to picks and other tools.

Valves and Valve-Geer for Steam Engines.—Patentees, Addison Crosby, Simeon Savage, and Herman S. Stearns, all of Fredonia, N. Y.—This is an improvement in oscillating valves and their connections, which could be made plain only by engravings.

Rotary Planes.—Patentee, John Sperry, of New York.—Though a very simple engraving would convey a clear idea of this invention, it is a mere waste of words to attempt to render it intelligible by letter press description.

Nail Plate Feeder.—Patentees, John W. Hoard and Thomas A. Searle, of Providence, R. I.—This is an improved apparatus for feeding the plates from which nails are cut to the nail-making machine. It would require diagrams to make it intelligible, but it is a very ingenious arrangement.

Breech-Loading Cannon.—Patentee, Charles F. Brown, of Warren, R. I.—This invention was illustrated and described on page 240, Vol. III. (new series), Scientific American.

Apparatus for Lifting Vessels Out of Water.—Patentee, Horace I. Crandall, of New Bedford, Mass.—This lifting dock was illustrated and described on page 406, Vol. III (new series), Scientific American.

Great Storms in England—The Crystal Palace Damaged.

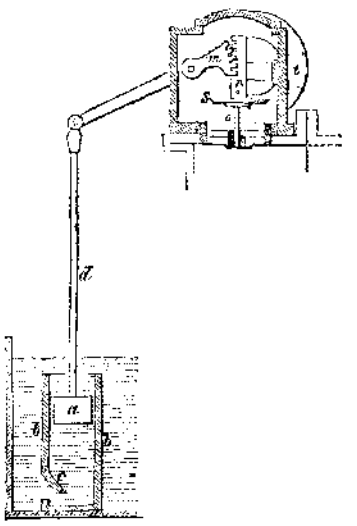
By the recent news from England, we learn that very severe storms have visited the British Isles, and done much damage to shipping and buildings. Several American ships have been wrecked, and about 140 British driven on shore in one night. One of the towers of the Crystal Palace, at Sydenham, has been destroyed. The wind coming in terrific gusts communicated a dangerous vibratory motion to the tower until at last it toppled over with a terrible crash. The iron columns were broken into little pieces as if they had been glass, and the ruins presented the appearance of being shattered by a tremendous explosion. The main part of the Palace was not the least affected. This tower will not be erected as it was of little use, nor will its absence injure the general effect of the structure.

ROMANCE OF THE STEAM ENGINE.

Article XVI.

WATT—THE DASH POT.

In our last article we illustrated the indicator invented by Watt, to measure the actual power developed in the cylinder of an engine. The accompanying figure represents the "dash pot" which Watt invented to graduate the descent of the puppet valve into its seat, to prevent it from slamming. There are two common methods of operating valves through the rods. One is by a *positive*, and the other by a *free* motion. The former is exemplified in engines having slide valves, the rods of which are positively united to the eccentrics; the latter is exhibited on the beam engines of our steamboats, the valve rods of which are lifted by toes or wipers, then fall into their seats by their own gravity. James Watt used puppet valves similar to those on common beam engines; these were operated by tappets on a "plug frame," and the valves dropped into their seats. A small vessel or cistern containing water was placed under the valve box, and in it was secured a small cylinder, *b*, with a plunger, *a*, in it, connected to the valve by a rod, *d*. A valve, *c*, opened into the cylinder, communicating with the cistern, and the plunger, *a*, has a water space around it. When the plunger, *a*, is drawn up, the valve, *c*, opens and the water flows into the cylinder; but when the plunger, *a*, descends, the valve, *c*, closes, and the water which is displaced rises between the plunger and the cylinder. The resistance



thus offered to the descent of the plunger prevents the valve dropping violently into its seat, as the water forms a graduating cushion to the descent of the plunger. At the same time, the plunger, by moving in water, enables the valve to be operated almost like a balanced valve in its lifting action.

In other arrangements, Watt hung balance weights on horizontal levers that vibrated on a joint, so as to permit his valves being operated easily—an arrangement which is substantially applied to many of our approved engines of recent construction.

The dash pot is now employed in our American beam engines, the valves of which are operated by vibrating lifters; but so far as we have been able to learn, it was first thus applied, about eighteen years ago, in connection with Sickle's cut-off, and at that time was supposed to be a new invention. And, indeed, we believe there are few who are fully aware of the age of this device, as, in a conversation which we had not long since with one of our old and experienced engineers, he expressed surprise when we told him that the dash pot on his engine was one of Watt's creations. The plunger in the dash pot of our engines has a space in it, into which the water enters during its descent, but otherwise the principle is the same as that here represented. The mode of connecting the valve stem, *o*, with the rod through tooth connections, *m n*, as represented in this figure, is not employed on the engines of the present day.

At the present time we can scarcely form an idea of the difficulties and perplexities which harassed Watt in his labors to construct the first steam engines and apply them to practical purposes. The tools which belong to the engineering establishments of the present day are so numerous and perfect in their action, that there is no difficulty experienced in executing all kinds of engineering work in the most accurate manner. It was very different, however, in the infancy of steam engineering. There was not a single machine in use capable of boring a cylinder correctly, consequently it was difficult to make the piston work steam tight; there were also no iron planers then in use, and it was almost impossible to obtain accurate joints in fitting the parts of the engines together. To all these different departments of mechanism Watt had to direct his attention, and it is fortunate for the world that he had originally been a most skillful machinist and maker of the most delicate philosophical instruments. He not only improved the steam engine in all its most essential features, but his active and inventive mind devised machines for the proper construction of its various parts; he organized the entire system of engine construction and steam engineering.

The Whaling Business.

An article in a recent issue of the Boston *Commercial Bulletin*, contains some very interesting information on this subject. For many years New Bedford, Mass., has been known, not only as the greatest whaling port in the United States, but the whole world; it is now, however, falling fast from its former oily greatness. In 1857, there were 329 vessels of 111,364 tuns belonging to New Bedford; but at the present time there are only 291 vessels of 98,760 tuns, a decrease of 38 vessels and 12,604 tuns. This reduction has not been caused by losses of ships at sea, but by their withdrawal from the trade, as the business has been very unprofitable for the past four years. The price of whale oil has been greatly affected by substitutes, especially coal oil, and the more general adoption of gas in cities and large villages. In 1860, the price of whale oil was only 50 cents per gallon, while in 1857 it was 73 cents, and this reduction of price was accompanied with another blow at whaling, namely, a very limited catch of whales. In 1857, the average catch was 800 barrels; last year it was only 500 barrels.

One-half of the whaling fleet is devoted to the sperm whale fishery, the other half to the right whale fishery. One-half of all the sperm oil obtained goes to England, and amounts to about 75,500 barrels annually, valued at $1,500,000. The right whale produces all the whalebone, most of which goes to Germany; the annual value of it is $1,000,000. The amount invested in the whaling trade in New Bedford is $10,000,000. Many of the merchants in that place are now looking around to see if they cannot enter upon a more profitable business. The total whaling fleet of the United States now comprises 514 vessels of 158,746 tuns. There has been a total decrease of 141 ships in four years. In 1858 two hundred ships went to the North Pacific for whale oil; it is expected that only one hundred will go this year.

How to Prosper in Business.—In the first place, make up your mind to accomplish whatever you undertake; decide upon some particular employment, and persevere in it. All difficulties are overcome by diligence and assiduity. Be not afraid to work with your hands, and diligently too. "A cat in gloves catches no mice." He who remains in the mill grinds; not he who goes and comes. Attend to your own business; never trust to any one else: "a pot that belongs to too many is ill-stirred and worse boiled." Be frugal: "that which will not make a pot will make a pot-lid;" "save the pence, and the pounds will take care of thenselves." Be abstemious: "who dainties love shall beggars prove." Rise early: "the sleepy fox catches no poultry;" "plow deep while sluggards sleep, and you will have corn to sell and keep." Treat every one with respect and civility: "everything is gained and nothing lost by courtesy;" "good manners insure success." Never anticipate wealth from any other source than labor—especially never place dependence upon becoming the possessor of an inheritance: "he who waits for dead men's shoes may have to go a long time barefoot;" "he who runs after a shadow hath a wearisome race." Above all things, never despair—God is where he was; "He helps those who truly trust in Him."

Wealth of Indiana.—The Auditor of the State of Indiana reports the total assessment of property in the State at $455,011,378. As the population is 1,350,802, this gives an average of $336 to each inhabitant.