(*Continued from first page*).
ports are also obtained by the same eccentric and wrist plate, but with greater rapidity, as the travel is greater on the opening of the exhaust.

The constant variations of load upon the engine are communicated to the steam valves instantly by the governor. The latter is extremely sensitive, and in reality performs very slight labor, since it puts forth only the force necessary to move a small stop, and indicates merely the change required, to the levers which move the valves. There is an ingenious stop motion provided, which, should the regulator become inoperative through any cause, effectually prevents the engine running away. The mechanism is such that the steam valves are then not allowed to hook on, and therefore they cannot open. Consequently the engine is stopped by this mechanism alone, although the screw valve may be wide open.

The principal improvement to which it is the object of the present article to direct the reader's attentention, as has already been noted, is found in the means of packing the valve stems so as to obviate the stuffing boxes, while at the same time rendering them self-packing. Hitherto, in order to prevent the grinding of the cast iron faces of the valve and bonnet, a collar has been placed out on the valve stem so as to bear against a heavy cast iron bracket or bonnet secured to the side of the cylinder. This counteracted the thrust on the valve stem—if we may use the term—due to the steam pressure within, which otherwise would force the faces mentioned together, cause wear, and speedily render the mechanism untrue. In addition to this collar, the usual gland and stuffing box for the valve stem were required. Apart from there being here a multiplicity of parts, which it would be a great advantage to simplify, the casting, of course, had to be painted, and the paint in time would, by the heat, become cracked and worn; while the lubrication of the stem, with consequent unsightly dripping, aided in rendering the whole contrivance one for which a neater and better arrangement might well be sought.

The new device which has lately been substituted (but which has now been tested by the manufacturer for nearly four years), and a sectional view of which is given in Fig. 3, seems to remove all difficulties. It obviates the stuffing box completely, and shifts the thrust collar from the outside to the inside of the cylinder, and, abolishing the extra cast iron bracket, causes the collar to bear directly against the bonnet, E. D is the valve stem on which is shrunk the steel collar, F, which, as shown, fits in a recess, *a*, of the bonnet. The opposing faces are finely scraped in manner similar to planer slides or lathe ways. Consequently they approximate very closely, and are packed by the steam itself acting outward on an area equal to the section of the valve stem, D. It will be seen at once that the joint is self-packed, while its chances of wear are exceedingly small, certainly very minute in comparison to what might be the case with cast iron surfaces, perhaps 8 inches in diameter, under other arrangements. The bonnet, E, now becomes a finely polished casting, rendered light by the hollow chamber within. Into this space all drip enters, and is carried off by the pipes, G, which, as shown in the large engraving, extend from bonnet to bonnet, so as to keep all clear and empty.

The other improvement which may be noted is not represented in the engravings. It is, however, a novel piston packing, devised by Messrs. Babbitt and Harris, and which has been in practical use by them for some four years and a half. Its efficiency will be understood from the fact that single-acting engines, in the cylinders of which it has been applied, have frequently run for an entire day at a time with the back cylinder head off, and this with no leakage past the piston. The general construction is simply a packing ring, in sections, inserted in a groove in a chunk ring, and held out, not by steam, but by spiral springs made of German silver. When steam is admitted into either end of the cylinder, the packing ring is carried by the steam over to the side of the groove in the chunk ring, making a joint there and allowing the steam to pass down by and under the packing ring. The latter is thus balanced, while a very light spring is able to exceed the action of gravity and hold the ring out. The packing is very easily taken out and put in, as it is all held in its place in the chunk ring by pins for that purpose, which are removed before putting on the follower. It is stated to be free from the defects of steam packing, and, with proper cylinder oil, not to require renewal for years. The engine is comely in all its proportions, as the engravings show, and finished in the best manner possible. It remains now to sum up briefly the advantages which are claimed for the machine, which claims seem, from its construction, to be well founded. They are economy of fuel, wear, oil, and all that relates to the production of power; an increased amount of work, regularity of speed under varying load and pressure, accessibility of all parts; no portion of the regulating medium acts through stuffing boxes nor enters the steam chest, nor is out of sight of the engineer; the cylinders are bored out of hard, strong iron; the shafts are made of hammered wrought iron, with ample bearings; the stop motion, as already explained, prevents running away; and the recessed valve seats prevent the possibility of shoulders wearing on them. Lastly, and we reserve it to the last because it is a point the value of which we have frequently urged upon engineers, the small parts of the engines are interchangeable; and therefore should accident occur, the injured portion can be speedily and accurately replaced from the manufactory. The manufacturer even keeps extra cylinders on hand to meet such emergencies, while, by the aid of special tools, he is enabled to construct the whole engine, from 10 to 1,000 horse power, in a manner both thorough and exact.

The machine is based entirely on the Corliss system, and was constructed under the same patents during their continuance. It therefore embodies the advantages of engines of that type, together with those secured by the improvements invented by its manufacturer.

The Harris-Corliss engine gained gold medals at the Cincinnati fairs of 1873, 1874, and 1875, and in the last-mentioned year an additional premium of $300 in gold. It is not exhibited in the Centennial Exposition, we are requested to state, on account of the inability of the manufacturer and the Centennial authorities to reach an arrangement satisfactory to the former. For further information, address the manufacturer, Mr. William A. Harris, Providence, Rhode Island.

Why is the Sea Salt?

Professor Chapman, of University College, Toronto, says that the object of the saltness of sea water is to regulate evaporation. If any temporary cause raises the amount of saline matter in the sea to more than its normal value, evaporation goes on more and more slowly. If the value be depreciated by the addition of fresh water in undue excess, the evaporating power is the more and more increased. He

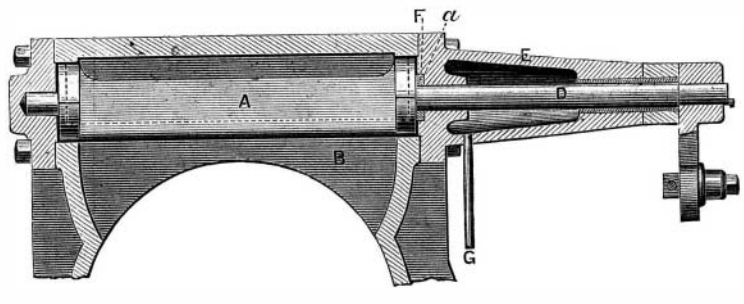
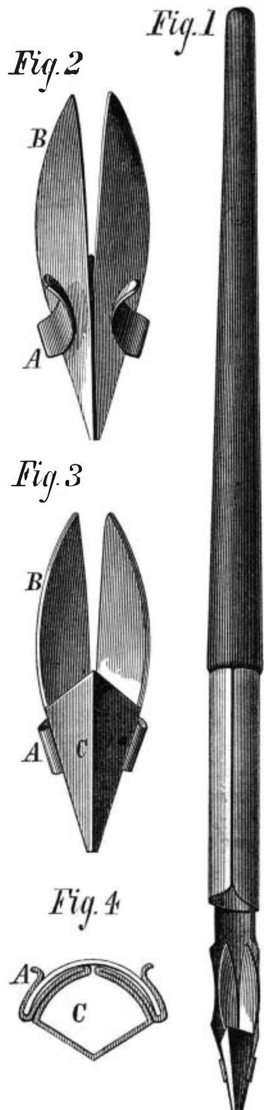


Fig. 3.—THE HARRIS-CORLISS STEAM ENGINE.

gives the results of various experiments in reference to evaporation on weighed quantities of ordinary rain water and water holding in solution 2·6 per cent of salt. The excess of loss of the rain water compared with the salt solution was, for the first twenty-four hours, 0·54 per cent, at the close of forty-eight hours, 1·46 per cent, and so on in an increasing ratio.

IMPROVED FOUNTAIN PEN.

The annexed engravings represent an ingenious little invention, well calculated to be of service to the large class of persons who constantly use the pen. It is a fountain at-



tachment for pens of all kinds, easily attached and detached, and supplying a large quantity of ink without interfering with the elasticity of the pen. The disadvantage often met with in fountain pens, no one of which, of course, can be constructed to suit the requirements of all hands, is thus avoided, for the writer, after securing a pen that suits him, has only to apply the attachment.

Fig. 1 of the engraving represents the device in full size and in place. Figs. 2 and 3 are, respectively, front and rear views enlarged. Fig. 4 is a transverse section. It is made of one piece of sheet metal having clasps, A, bent up from elongated wings, B, which last are separated by a slit and fitted to the concave inner side of the pen. Below the wing plates is the reservoir, C, whence the ink flows down to the point of the pen. The spring clasps firmly secure the device to the pen in the manner indicated in the sectional view.

The inventor states that the large quantity of ink taken up at one dipping is always under control, and that a clear sharp outline is left by the pen. The capillary attraction of the inner sides of the device is so great that the possibility of the ink dropping out, when inverted, is avoided, while the quantity of ink contained will last from 20 to 30 minutes. The attachment, being made of gold or silver, or heavily plated, is unaffected by the action of the ink, and will last indefinitely. Patented through the Scientific American Patent Agency, June 13, 1876. For further information, address the inventor, Mr. Henry H. Perkins, P. O. Box 585, Utica, N. Y.

To Preserve Flowers and Plants.

The following instructions are from the pen of Rev. G. Henslow, one of the best practical botanists in England.

The materials required are common cartridge paper, thick white blotting paper, cotton wadding, and millboard, all cut to the same size. The plants should be gathered in dry weather, and soon after the flowers open, when their colors are brightest. Succulent plants such as daffodil, orchis, or stone crop) should be put into scalding water, with the exception of the flowers, for a minute or two, then laid on a cloth to dry.

Arrange the specimens and papers in the following order: Millboard, cartridge paper, wadding (split open, and the glazed side placed next to the cartridge paper), blotting paper, the specimens, having small pieces of wadding placed within and around the flowers to draw off all the moisture as quickly as possible, blotting paper, wadding as before, cartridge paper, millboard. When the specimens, etc., are thus arranged heavy weights should be put on them; about 30 lbs. the first day, 60 lbs. afterwards. Remove them, from under pressure, in a day or two; carefully take nway all the papers, etc., except the blotting papers between which the specimens are placed; put these in a warm air to dry, while the removed papers, etc., are dried in the sun, or by the fire. When dry (but not warm) place them in the same order as before; put all under the heavier pressure for a few days, when (if not succulent) they will be dry.

Flowers of different colors require different treatment to preserve their colors. Blue flowers must be dried with heat, either under a case of hot sand before a fire, with a hot iron, or in a cool oven. Red flowers are injured by heat; they require to be washed with muriatic acid, diluted in spirits of wine, to fix the color. One part of acid to three parts of spirit is about the proportion. The best brush with which to apply this mixture is the head of a thistle when in seed, as the acid destroys a hair pencil, and injures whatever it touches (except glass or china); therefore it should be used with great care. Many yellow flowers turn green even after they have remained yellow some weeks; they must therefore be dried repeatedly before the fire, and again after they are mounted on paper, and kept in a dry place. Purple flowers require as much care, or they soon turn a light brown. White flowers turn brown if handled or brushed before they are dried. Daisies, pansies, and some other flowers must not be removed from under pressure for two or three days, or the petals will curl up. As all dried plants (ferns excepted) are liable to be infested by minute insects, a small quantity of the poison corrosive sublimate, dissolved in spirits of wine, should be added to the paste, which it will also preserve from mold. The best cement for fixing the specimens on to the paper or cardboard is gum paste. It is composed of thick gum water and flour mixed in warm water, by adding the two together, warm, and of a consistence that will run off the hair pencil.

Tree Frog Eggs.

Professor Peters has lately described the mode of deposit of its eggs employed by a species of tree frog (*polypedates*) from tropical Western Africa. This species deposits its eggs, as is usual among batrachians, in a mass of albuminous jelly; but instead of placing this in the water, it attaches it to the leaves of trees which border the shore and overhang a water hole or pond. Here the albumen speedily dries, forming a horny or glazed coating of the leaf, enclosing the unimpregnated eggs in a strong envelope. Upon the advent of the rainy season, the albumen is softened, and with the eggs is washed into the pool below, now filled with water. Here the male frog finds the masses, and occupies himself with their impregnation.

Aerolite in Kentucky.

The Louisville *Courier-Journal* states that on July 18, at 4 A.M., Mr. White, watchman of the Weatherford engine house, while on duty, was startled by a loud report like that of a pistol, and instantly following some heavy substance feel into the street a few feet distant. Mr. White searched, and found imbedded in the ground a stone, of the appearance of dark flint, weighing about two pounds. The stone was broken to pieces and examined during the day by several scientific gentlemen, who pronounced it genuine meteoric substance. The probable solution is that the explosion occurred at a greater distance than was supposed, and that this was but a small fragment of a large aerolite.