IMPROVED STEAM ENGINE CUT-OFF.

We illustrate herewith a new and simple cut-off, which is positive in its action, has few parts, has no springs or other appliances requiring constant attention and delicate adjustment, and is controlled by the governor so as to cut off steam, we are informed, at from one sixteenth to seven tenths of the stroke. Fig. 1 is a horizontal section through valve chest and cylinder, and Fig. 2 a view of the cut-off mechanism, all of which, it will be noticed, is easily accessible.

The cut-off valve, A, Fig. 1, works on the back of the main slide valve, so that, when either end of the cut-off is down, the steam is shut off from that end of the slide, which moves freely under the cover of the cut-off valve. The shaft of the cut-off valve, it will be observed, is squared in order to admit of the firm attachment of the valve. Where the shaft passes through the steam chest, it fits into a simple bushing, next to which and within the chest there is a collar. The pressure of steam on the chest then forces the shaft outward, making a steamtight joint between the collar and inside end of the bushing. The use of a stuffing box is thus avoided, and friction is greatly reduced.

Outside the valve chest and rigidly attached to the rock shaft is the rock lever, B. In this are guides (dotted lines) for rack bars, C, upon which bars are formed stops, as shown in Fig. 2. D is the governor rod which, by a short lever, is connected with a pinion which is loose upon the valve rock shaft, and which engages the rack bars, C. It will be evident that any motion communicated to the pinion from the governor will cause the rack bars to advance and recede, and in this way the stops will be moved either nearer together or further apart, in horizontal direction. E is a rod which connects with a bell crank, which is vibrated by an eccentric on the main shaft. This rod moves a sliding bar, F, upon which toes or stops are attached. Inspection of Fig. 2 will show that, as this bar reciprocates, the beveled sides of its stops will come in contact with the stops on the rock lever, B. And as one or the other pair of stops come in contact, the result will be, as the sliding bar continues its motion, that the rock lever will be pushed to the right or left; the valve shaft will thus be vibrated, and consequently the cut-off valve itself will be brought down upon one or the other end of the slide. Now it is clear that the time when this vibration of the cut-off shall occur depends upon the time, sooner or later, when the stops on the sliding bar come in contact with the stops on the rock lever; and if the horizontal distance between the latter is decreased, then this contact will occur sooner, and steam will be cut off earlier in the stroke; while, if it be increased, just the reverse will obtain.

But the distance between the stops on the rock bar depends upon the relative position of the rack bars, C. By slightly converging their guides toward the end of the rock bar, the contact of these stops with those on the sliding bar tends to give the same angular movement to the lever, whether the former are at the outer or inner end of their travel. Then the governor, as already explained, regulates the position of the rack bars, C, and thus controls the action of the device. The inventor points out that the lift of the cut-off valve is very small and need not be more than half the width of the induction port. The outside lap of the cut-off valve is so proportioned in relation to the steam ports in the main slide valve that, when one end of the cut-off valve is down on the back of the main slide, shutting steam off from that end of the cylinder, the pressure on the back of the cut-off valve is equal to the difference of the pressure of the steam in the steam chest and the expanding steam in the cylinder. When the piston has arrived at the end of its stroke, the main slide valve has moved back half its stroke, *plus* the lap and lead, to admit steam to that end of the cylinder; at the same time the main slide has closed the cylinder port at the other end of the cylinder; and its induction port has traveled past the end of the cut-off valve, admitting live steam to the under side of the plate, thus putting the cut-off valve in equilibrium. Consequently the sliding bar, which gives motion to the rock shaft lever, through the toes in the bar and the stops in the lever, has no other resistance to overcome than simply the inertia of the valve, when called upon to move it so as to cut off the steam. The device, we are informed, can be applied cheaply to engines that are now built, or running, and requires but slight alteration to existing patterns.

Patented January 16, 1877. For further particulars relative to sale of patent to shops, States, Territories, or on royalty, address the inventor, Mr. J. Fish, Summit, Union county, N. J.

BLUE glass will cure a Spitz dog of hydrophobia. Pound it up fine, and mix it with his food.

Fig 1

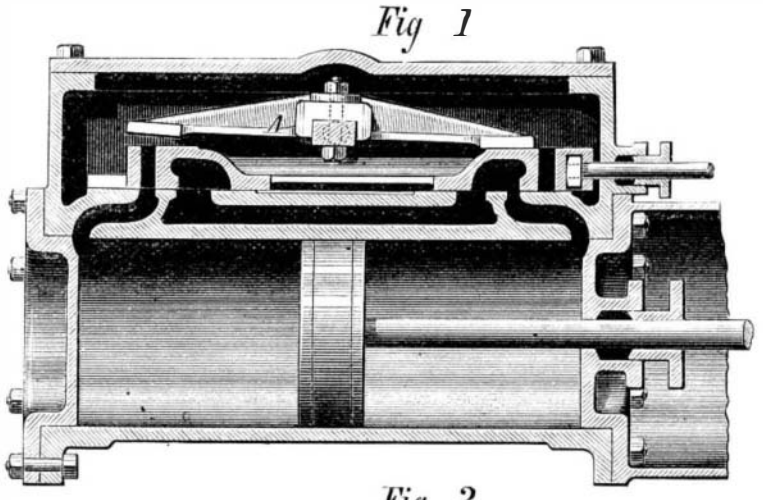
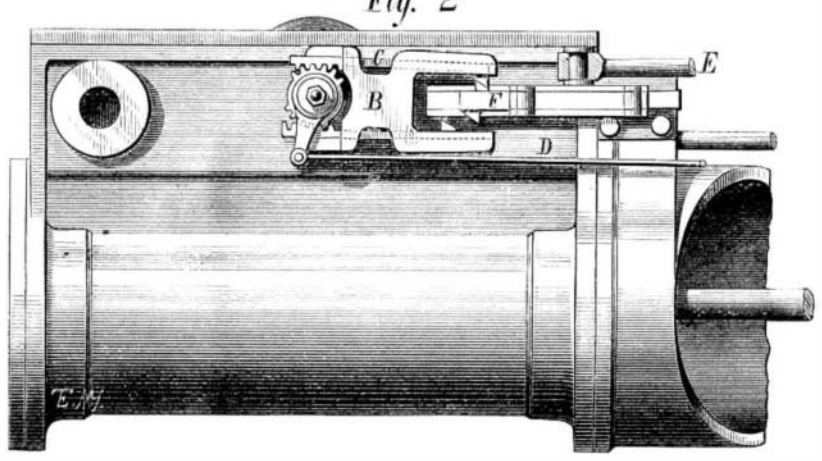


Fig. 2



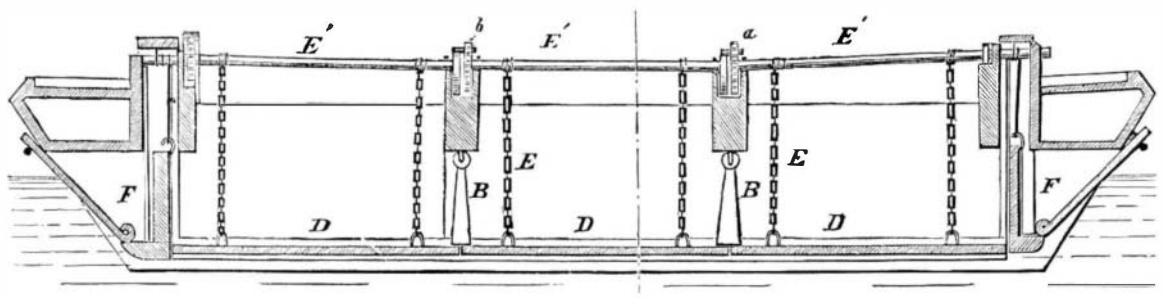
FISH'S VARIABLE CUT-OFF.

Gas Iron.

The entire product of the Etna Iron Works, Allegheny City, Pa., is worked and heated in all departments with natural gas, brought to the works through pipes from the wells, which are nearly 1,500 feet deep, and situated in Butler county, Pa., 19 miles from the mills. Iron treated with this fuel—pure hydrogen and carbon compounds—becomes homogeneous, and has a uniform strength and finish not to be found in ordinary grades of iron. The superiority of natural gas iron is attributed to the amazing heating power of this new agent, as well as to an entire absence of sulphur and other impurities met with in all coals, and absorbed readily by iron when in a highly heated state.

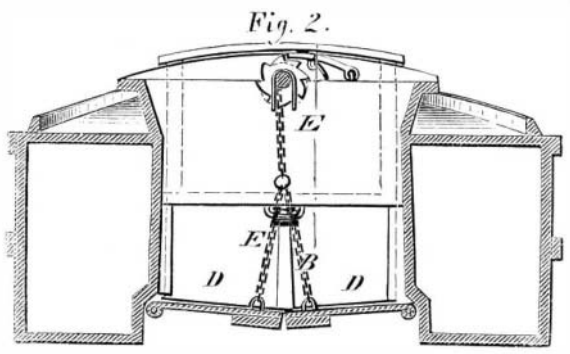
A NEW DUMPING SCOW.

We illustrate herewith a new dumping scow, which is so constructed as to admit of the rapid and convenient discharge of the load into the water by the automatic action of gates and the sweep of the water through the scow. The vessel is built in two separate boat-like structures, laterally connected, between which is a large intermediate space for material to be transported. This central space is divided into compartments that are closed at the bottom by hinged drop gates, D, which bear against the lower enlarged ends of pendent arms, E', when they are closed. Each gate is raised or lowered by means of suspension chains, E, at the ends, that



ALLEN'S DUMPING SCOW.—Fig. 1.

Fig. 2.



branch out from one common chain wound up on the ends of each top shaft, E', for each pocket. The shafts, E', turn in suitable bearings for winding up the chains by suitable crank or lever mechanisms, being retained by ratchets and pawls. The chains are alternately wound on the shafts in an opposite direction, so that, when the pawl of the first shaft is released, the weight of the contents on the gates drop them and turn the shafts, releasing, by the pawl and cam connections of the shafts, successively the remaining shaft sections, so as to drop automatically the gates and empty all the pockets. Simultaneously with the dropping of the bottom gates, vertically guided end gates, F, are raised when the water has full sweep through the scow, so as to produce the rapid submerging of the contents from the pockets. The entire load of the scow can thus be easily and rapidly discharged without requiring a large number of hands, and without loss of time. After the load is dropped into the water the bottom gates are raised, and simultaneously therewith the end gates and guard plates are closed.

Patented through the Scientific American Patent Agency, November 28, 1876, by Mr. Daniel Allen, of Rondout, N.Y.

Patent Rubber Worm—A New Fish Bait.

Those small boys who are in the habit of converting their mouths into bait boxes, when they go fishing, will be gratified to learn that, through the genius of a recent inventor, they may continue to use that convenient receptacle for a new bait which is free from the disadvantages peculiar to the angle worm. Any boy who has meditated over the shortcomings of that slimy invertebrate knows that it squirms disagreeably, especially when accidentally bitten, that it has an affinity for dirt, which is annoying when swallowed; that, even when on the hook, it has a way of dissolving off in the most unaccountable and exasperating manner; and that it perversely permits itself to be carried off piecemeal by suckers and minnows, in total disregard of its legitimate purpose. There can be no doubt that the day of the angle worm has passed, and that against the improved flexible rubber worm of Mr. W.H. Gregg (patented January 2, 1877) he can no longer hope to compete. Serving as bait, and at the same time as chewing gum, it must be evident to the least thoughtful that the rubber worm has an incontestable advantage.

Report of the Chief of Engineers, U.S.A.

There are 107 officers in the engineer corps of the United States Army. Sundry economical critics, while urging great reductions in the numerical force of our military service, have dwelt upon the fact that the said officers are virtually in possession of sinecures, and that a smaller number could perform all the necessary work. As it requires three large volumes of nearly 800 pages each to contain the reports of these gentlemen for a single year, and as not only was every individual of them on active service during the entire period, but additional civilian professional aid was largely needed, we strongly doubt whether their offices are likely to be sought after by those in quest of small work and large pay.

The report before us is carried up to June 30, 1876. Part I. contains the report of General Humphreys, Chief of Engineers, which is a summary of the material spread at length throughout the remainder of the work. From this it appears that 156 operations, looking to the improvement of rivers, harbors, etc., were carried on, and that during the year over six million dollars were expended therefor. The full details of the various undertakings, illustrated by a large number of maps and diagrams, occupy the remainder of Part I. and all of Part II. In Part III. there is a valuable series of notes on European surveys compiled by Major C. B. Comstock. These also are copiously illustrated, mainly with reproductions of the charts of different nations. There is a full report of Lieutenant Wheeler's surveys west of the 100th meridian and of the Yellowstone surveys. The work as a whole is an exceedingly instructive and valuable production, and may be recommended to the careful study of engineers.

Centennial Medals.

An editorial in the New York *Tribune* recently censured the managers of the Centennial Exhibition for the delay in delivering the medals of awards. Mr. Goshorn replies to the *Tribune's* strictures, through the Philadelphia *Evening Bulletin*, that such a thing as the delivery of medals three or four months after the close of an exhibition was never heard of, and that the medals for the Vienna Exposition of 1873 are still being distributed. The Centennial medals are now being manufactured at the United States Mint, Philadelphia, and Mr. Goshorn does not think that more than 500 have as yet been struck off. The medals will be given out as soon as they are ready, and all in good time.

This answer will be satisfactory to several of our correspondents who have inquired as to when the medals would be delivered.