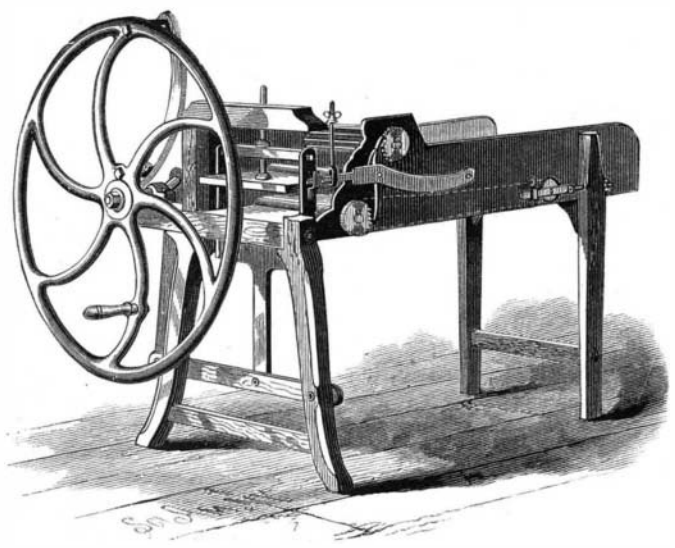
IMPROVED STRAW CUTTER.

We give an engraving of an improved feed cutting machine recently patented by Mr. Peter Stuerholdt, of Stillwater, Minn. In this machine a vertically reciprocating press operates in conjunction with the knife attached to and rotating with the fly wheel, the object being to provide a press actuated from the main shaft of the machine, and reciprocating simultaneously with the revolution of the fly wheel carrying the knife, so that the press will descend and compress the material as it is fed to the knife, just before the knife begins to cut. After the stroke and passage of the knife, the further revolution of the fly wheel raises the press and opens it for the passage of straw through the jaws of the box. An endless apron, carrying and feeding the straw to the knife, is moved by drums, and the forward drum is provided on its outer axis or journal with a ratchet wheel, which is actuated by the lower arm of the pawl. On the outside of the box of the machine is a lever, pivoted to the side of the box. This lever receivesits motion from the press slide, and communicates motion to the feed mechanism through the pawls above mentioned.



STUERHOLDT'S STRAW CUTTER.

Inside the box and at a suitable distance in the rear of the press and over the apron there is a feed roller, which is ribbed on its surface longitudinally, and is provided on its outer journal with a ratchet wheel which is engaged by the pawl carried by the side lever.

This machine is rapid in its operation, and simple and inexpensive in its construction.

Compressd Air Engines in Tunnels.

M. Mekarski, well known in connection with compressed air tramway engines, has published calculations to show that compressed air could not be used for the Channel Tunnel except at some difficulty. With a pressure of 5 kilogrammes per square millimeter, and an average temperature of 15° C., the work of the compressed air, expanding two and a half times, would be 11,179 kilogrammeters, and the consumption of air per hour per horse power would be 24·15 kilogrammes. For one passage through the tunnel, the consumption of air at ordinary pressure would be 64,915 kilogrammes, or 177 cubic centimeters, at a pressure of 30 atmospheres. Placing the latter figure at 200 for safety's sake, and computing the weight of the reservoirs to carry the compressed air at 600 to 700 kilogrammes per cubic meter, we should have a total weight of the tender containing the necessary compressed air of 200 tons, which would reduce the load carried from 400 tons, as supposed in his calculations, to 200 tons. M. Mekarski proposes instead, to use the ordinary locomotives, and to run them with a mixture of air and steam. He carries the air in reservoirs—capacity 20 cubic meters—at a pressure of 35 kilogrammes per square inch. These reservoirs communicate with the boiler through an automatic device, which allows the air to enter it only when steam pressure falls below a given minimum. An auxiliary pipe from the air reservoir is to be conducted under the grate, in order to increase the rate of combustion if necessary. The engineer runs the locomotive with a growing quantity of air as he gets farther into the tunnel, and thus M. Mekarski thinks he could reduce the quantity of coal burnt in the tunnel.

Bleaching of Silk.

In this process the silk to be bleached is dipped in a more or less concentrated solution of bromine, according as the coloring matter is stronger or weaker. The duration of the immersion amounts to thirty minutes. After the silk has been drained, it is conveyed to a second bath, which consists of some dilute acid. After the expiration of about half an hour the goods are taken out and again left to drain off. Frequently two or more bromine baths, with as many succeeding acid baths, are necessary. Tartaric and citric acids furnish the best results; moreover, they can also be replaced by alkaline solutions, for which purpose sodium carbonate is best fitted. Sulphates and acid sulphates, as well as sulphuric acid, are likewise suitable for the second bath.—*Palangie and Bedu.*

ELECTRICAL APPARATUS FOR STOPPING STEAM ENGINES.

The object of this invention, by Duncan Bros., London, is to automatically close the valve of a steam engine, and therefore stop it; and to do this in the quickest possible manner the inventor has had recourse to a very simple electrical expedient.

The apparatus shown in Fig. 1 consists of an electro-magnet, battery, and wires leading to any position from which it may be desirable to control the engine, and press buttons for completing the circuit. Also a small steam cylinder, piston, and rack and pinion gearing, which actuates the stop valve on the engine.

The electro-magnet is placed at the top, and connected, as may be seen more plainly in Fig. 2, to a suspension rod which actuates a small steam cock on the cylinder of the apparatus. When it is desired to put the apparatus in operation, the pressure of the finger on one of the buttons—at any distance from the engine—closes the circuit, excites the electro-magnet, and causes it to lift its armature and release the suspension rod, which falls with a velocity due to its own weight. The suspension rod in falling opens the small cock on the cylinder and admits steam, the initial pressure of steam being the same as in the steam engine cylinder. The piston in the cylinder of the apparatus immediately ascends and the rack piston rod instantly closes the engine stop valve.

The steam to work the apparatus being taken from the stop valve chamber from underneath the valve—*i. e.*, between the valve and the steam engine cylinder—the consequence is that as soon as the stop valve has been closed there is no longer any pressure in the small cylinder; and when it is desired to start the engine the engine driver has simply to lift up the suspension rod to its normal position and open the stop valve in the ordinary way. In lifting the suspension rod the small cylinder cock is again closed against the admission of steam, but the cock having three passages is opened for the inlet of atmospheric air. The act of opening the stop valve by the hand wheel operates also on the piston, which falls to the lower end of the small cylinder and is then reset for further use.

When applied to the stop valves of condensing engines, a cock fitted on a pipe opening to the atmosphere is also actuated by the apparatus, and at the instant the stop valve is closed this cock is opened, thus admitting air into the condenser, destroying the vacuum, and stopping the supply of water.

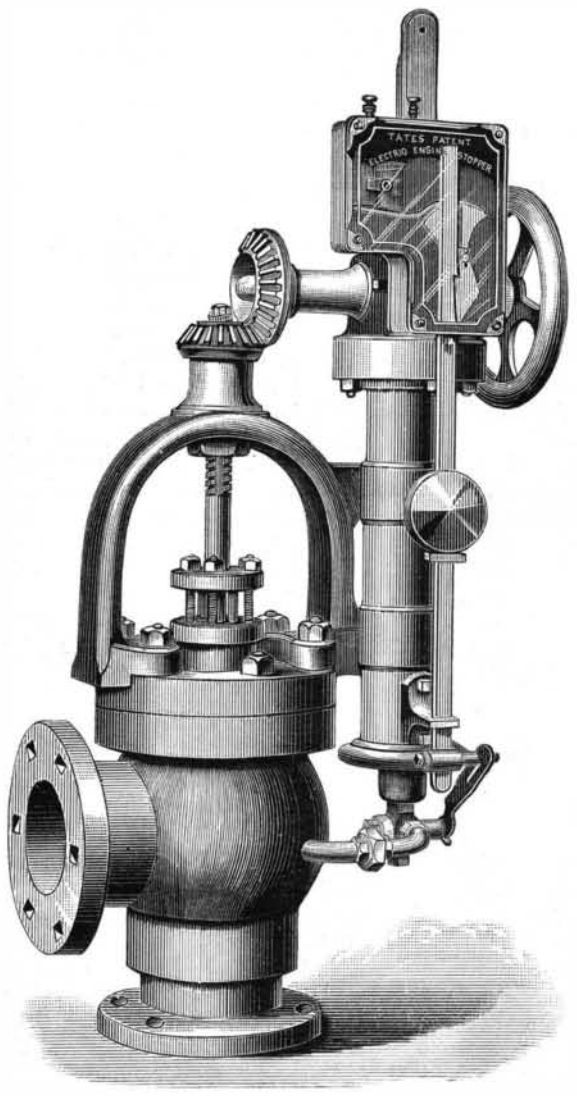


Fig. 1.—ELECTRICAL STOP DEVICE FOR STEAM ENGINES.

The apparatus also stops the engine on which it is fitted whenever the speed exceeds the ordinary rate by any given number of revolutions. This is effected by means of the throttle, or variable expansion valves, actuated by the engine governor. Short arms are fixed on the valve spindles which act as fingers to press in a push or button at any time the valve exceeds the usual range of lift or stroke.

By looking at Fig. 2 the action of the apparatus will be clearly seen. The suspension rod, E, is held in position by the tooth in the locking piece, D. The cam-shaped piece, C, is kept back by the end of the armature, A, which is lifted when a current is passed through the electro-magnet, M. When this occurs, C falls over by its own weight, and striking a projection on the back of D knocks this locking piece away, and the suspension rod thereupon falls and performs the operation assigned to it. As far as the parts of the apparatus directly actuated by the electric current are concerned, they are of the most simple character, and there is apparently nothing liable to get out of order. It is oftentimes, says the *Electrical Review*, very important that engines shall be quickly stopped, and we cannot conceive a more simple or more effectual way than that devised by Mr. Tate. It is stated that this invention "brings within the reach of any person on board ship the power of stopping the engines at a moment's notice, and thus averting the dangers of accidents due to collisions and grounding. On every deck and in every compartment of the ship buttons can be placed (protected by glass covers), communicating with the electric battery, which by means of an electro-magnet actuates the valve-closing motion."

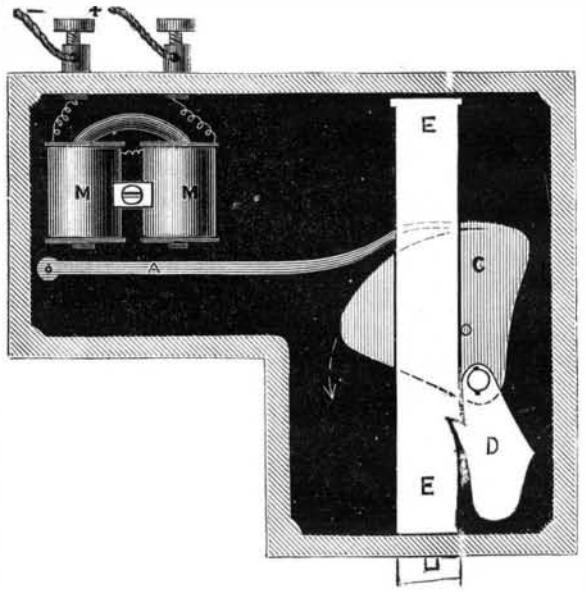


Fig. 2.—ELECTRICAL STOP DEVICE FOR STEAM ENGINES.

Strange Habit of Metapodius Femoratus, Fab.

The "thick-thighed metapodius" is a common insect in the Southern cotton fields, attracting attention by its buzzing flight and ungainly form. The numerous observers connected with the cotton insect investigation have observed it preying upon the cotton caterpillar, while Glover states that it has been observed to injure cherries in the Western States. Mr. Schwarz informs me that he has seen it sucking the moisture from the newly dropped excrement of some unknown bird. Its eggs, according to Glover, are smooth, short, oval, and have been found arranged around a pine leaf like a bead necklace.

In May of the present year, while studying the Northern army worm (*Leucania unipuncta*) in the wheat fields near Huntsville, Alabama, I found that among the other new natural enemies which this Southern irruption occasioned the metapodius was very conspicuous. Immediately upon entering the fields I was struck with its buzzing flight, and it was not long before I discovered one flying with an army worm impaled upon its beak. Watching its flight I soon saw it alight in the line of May weed (*Maruta cotula*) which surrounded the field, and hastening to the point, found it busily engaged in sucking the blood of the captured worm. I was about to step closer and bottle the specimen, when it began to crawl down the branch upon which it had alighted, with that ridiculously slow and majestic motion peculiar to Reduvius and other Heteropters, until it reached a crotch, where it dropped the shriveled corpse of the worm so that it hung exactly suspended. Up to this time I had been so interested in watching this individual that I had not looked about me closely, and now I was surprised to find that the whole long line of May weeds was fairly garnished with the empty skins of Leucania larvæ, each one hung with great nicety in some crotch. This same field I visited for three successive days, and in that time there was quite a perceptible increase in the number of the worms so placed. The sight of these suspended larvæ was certainly one of much interest, and, without seeing the great bug at work, I might have puzzled over it for a long time without any satisfactory explanation.

I shall not attempt to explain this curious procedure on the part of the metapodii. It is seemingly as unexplainable as the somewhat similar habit of the Southern loggerhead or shrike in impaling insects and other small animals upon thorns and sharp twigs. The worms are useless as further food, and certainly cannot be used as nidi for the eggs of the destroyer.—*L. O. Howard, American Naturalist.*

PROFESSOR FREEMAN, of the Johns Hopkins University, of Baltimore, concludes, from a long series of experiments, that electricity is not demonstrably disengaged by the evaporation of fluids.