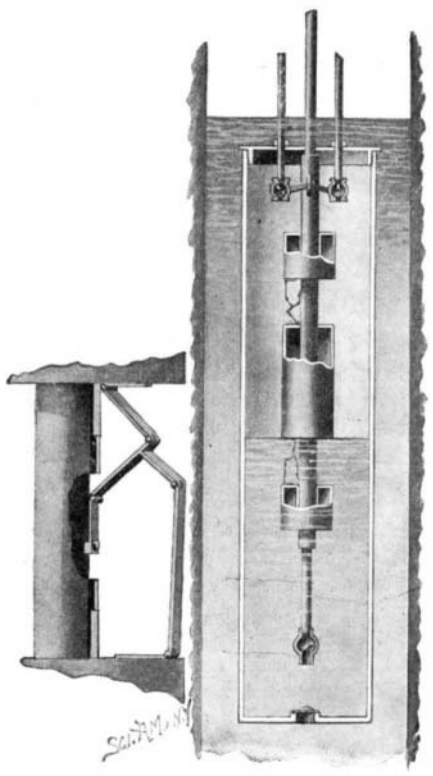
PNEUMATIC PUMP.

We illustrate in the accompanying engraving a rather ingenious type of pump, which is operated by compressed air. The pump consists of a closed chamber, which may be placed in a well below the level of the water. An upwardly-opening valve is provided in the bottom of the chamber, and projecting through the



NOVEL PUMP OPERATED BY COMPRESSED AIR.

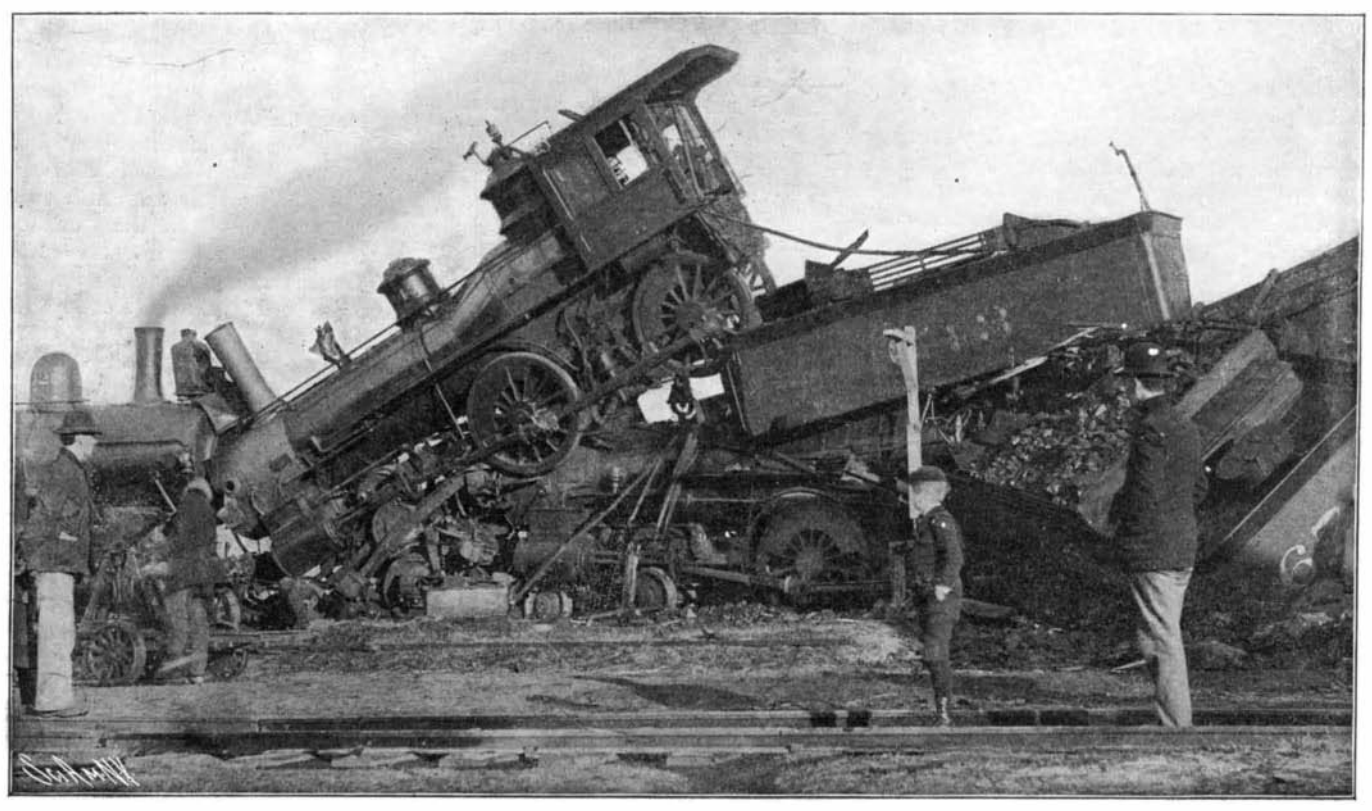
top is a standpipe which extends nearly to the bottom of the chamber. The standpipe carries a sleeve to which is secured a float. Above and below this float are two smaller supplementary floats, which slide freely on the sleeve. The main float is connected to the standpipe by two pairs of toggle levers, which pass through slots in the sleeve. One pair of toggle levers has lever connection with the upper supplementary float, and the other pair with the lower supplementary float. In addition to the standpipe two other pipes enter the top of the casing, the one at the right being the compressed-air pipe, and the other a discharge pipe which permits escape of the air while the chamber is filling. These pipes are provided with valves, which are operated by the sleeve on the standpipe, the arrangement being such that when the sleeve is up, the compressed-air pipe will be open and the discharge pipe closed, and when the sleeve is down, the discharge pipe will be open while the compressed-air pipe will be closed. In operation, when the air supply is cut off, water will flow up into the chamber through the valve in the bottom. The main float will be kept from rising by the weight of the upper supplementary float, which locks the upper pair of toggle levers. When, however, the water rises sufficiently to raise the upper float, the toggle lock will be broken, releasing the main float, which will rapidly and forcibly rise, carrying the sleeve up, and thereby opening the valve of the compressed-air pipe and closing that of the discharge pipe. The inflowing air will now force the water out of the chamber and up the standpipe. In the meantime the main float is kept from dropping by the buoyancy of the lower float, which holds the lower toggle levers in locked position. When, however, the level of the water falls below the lower float, the latter will drop, tripping the toggle, and permitting the main float to fall also. This reverses the position of the valves in the compressed air and discharge pipes, and permits the chamber to fill up again. The operation is then repeated. Some of the principal advantages of this pump are that when there is a small supply of water, it will pump all of it out as fast as it runs in; several wells can be run from one power by connecting air-supply pipes thereto, and the power need not be at the well, but wherever most convenient. The inventor of this pump is Mr. E. Hastain, at Tishomingo, Indian Territory.

ELECTRICAL APPARATUS FOR FELLING TREES.

A patent has recently been granted to Mr. T. O. Wilson, of Little Rock, Ark., on an electrical apparatus for felling trees and sawing logs. In place of a saw blade, this apparatus uses a platinum wire which is heated to a high temperature by an electric current, and this burns its way through the wood. The apparatus comprises a frame similar to that of a buck saw, across the lower end of which the resistance wire is stretched. The tension of the wire may be adjusted by a bar which extends between the side arms of the frame, and is clamped at one side by a thumb screw which passes through a slot in the bar. The upper end of the frame is provided with a coil spring adapted to draw the side arms together, to take up the slack in the resistance wire as it expands when heated by the current. Since ashes are apt to collect in the kerf and retard the burning of the wood, the inventor has provided a mechanism for reciprocating the saw frame. Furthermore, the resistance wire may also be wound with a short length of platinum wire, and the coils of the latter will act as drag teeth to remove the fine ashes and clear out the charred fragments. The mechanism for reciprocating the saw frame, which is clearly depicted in the engraving, may be driven by an electric motor. The apparatus offers the advantage that it may be operated at long distance from its source of power, thus giving it a wide radius of action. The inventor has designed the apparatus particularly for the use of lumbermen in felling trees. The electric saw permits of cutting off the trees very close to the ground, and at a much smaller expenditure of labor than with the usual hand-operated saw.

DESTRUCTIVE HEAD-ON COLLISION.

It is not often that one sees the destructive effect of a head-on collision between freight trains so graphically portrayed as it is in the accompanying illustration. The wreck occurred at Colo, Story County, Iowa, on the Chicago and Northwestern Railway, before daylight on a frosty and very foggy morning. The station lay at the foot of a heavy grade, and, at the time of the accident, a long freight train had just pulled in from the west, and was standing on the main track, the engine being near the depot building. A double-header train coming in from the east was intending to take the side track in order to allow the two trains to pass. For some reason or other, the brakes failed to work, and, the train failing to take the switch, the collision occurred. The engine at the head of the standing train remained on the track, only the forward trucks being displaced, and after the collision it was able to be removed under its own steam when the wreck had been cleared away. Of the two engines shown one above the other in our engraving, the one above was the leading engine of the pair at the time of the collision. The second engine, driven by the momentum of the train behind it, wedged its way under the tender ahead and was crushed under the forward engine, which it lifted up on end. The illustration gives forcible evidence of the great resisting power of a modern locomotive under the enormous strains and impact to which it is subjected in a wreck of this kind. We are indebted for our information and photograph to Mr. G. A. Fox, of Zearing, Iowa.



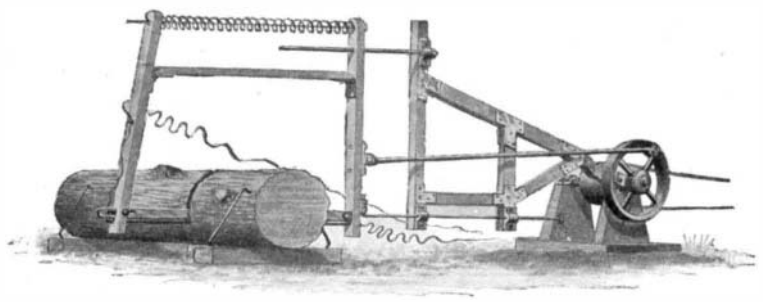
A DESTRUCTIVE HEAD-ON COLLISION IN WHICH THREE LOCOMOTIVES FIGURED.

Bovine and Human Bacilli Found to Be Distinct.

The Imperial Commission of consumption experts appointed by the German government some time ago to investigate the relations between bovine and human tuberculosis bacilli held an important meeting at the Imperial Health Department in Berlin, November 25. Dr. Weber, one of the most eminent members of the commission, reported on the work which that body has already done. The result of the investigations so far is to show that bovine and human bacilli are absolutely distinct biologically from one another. The one never develops or changes into the other.

So far the commission has examined the bodies of fifty-six persons who died from tuberculosis. In fifty cases only human bacilli could be discovered. In six cases, however, the bovine bacillus was found. Three of these cases were young children, and the surmise is permissible that they received the bacillus from the milk of a diseased cow. Two other cases which Dr. Weber regards as most important are those where the corpses showed bovine bacilli in the glands and human bacilli in all other portions of the body. These were distinct cases of double infection. Another most important case is one of lung tuberculosis, where in the diseased lung both bovine and human bacilli were associated.

The conclusion of the commission, in general terms, is that tuberculosis in human beings is caused by the human bacillus, but that it behooves us to be careful and to use all prescribed measures to secure ourselves against infection from bovine bacillus.



SAWING LUMBER WITH AN ELECTRICALLY-HEATED WIRE.

An interesting commercial development, to test the possibilities of steam lorries for collecting and distributing heavy traffic in remote agricultural districts in connection with railroads, has been made in the district of York, by the North-Eastern Railroad in conjunction with the Agricultural Organization Society on behalf of the Brandsby Dairy and Trading Association. The railroad authorities have established a service of motor-cars between their station at Tollerton, ten miles north of York, and Brandsby, eleven miles from Tollerton. The cars will run in each direction daily. Each steam lorry has a carrying capacity of five tons of freight, and is capable of hauling at least one trailer carrying two and a half tons. On the outward journey the lorry carries limestone, provisions, etc., and distributes the same around the various farms in the district. Simultaneously, the cars collect any produce that is to be forwarded by rail. By this system not only is transport facilitated, but the farmers in districts distant from the railroad are brought into closer contact with the markets, and the service will prove a considerable saving to them in the cost of haulage. If successful, similar services will be inaugurated elsewhere.