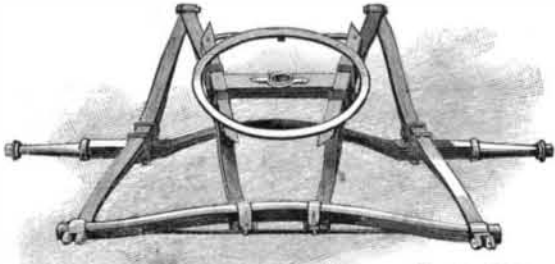


VEHICLE PLATFORM GEAR.

The side springs are secured to the axle in the ordinary manner by clips, and the ends of their main leaves are formed with eyes which rest within longitudinally slotted tubes. The central springs are also formed with eyes, which fit snugly within the forward tube, the ends of the spring being placed toward the center of the bar. The rear eyes are large enough to be slipped over the rear eyes of the side springs, the tube in this case being slipped over the eyes of both sets of springs. Rods passed through the tubes and eyes afford an additional support for the springs, and serve to strengthen the tubes which constitute the front and rear bars of the platform. The shaft clips are secured directly to the forward bar. The ends of the springs are clamped in place by clips. The frame constituting the bed of the fifth wheel is held to the two center springs. The rear tube may be entirely dispensed with, the overlapping ends of the springs being united by bolts, as shown in the cut,



HOLMAN'S VEHICLE-PLATFORM GEAR.

and for the forward tube may be substituted a wooden bar strengthened by an iron rod. This construction is particularly well adapted for all except very heavy wagons. This peculiar W formation of the platform prevents it from getting out of square, as each spring serves as a brace for the others.

This invention has been patented by Mr. Thomas H. Holman, of Newark, Ohio.

VERTICAL CHUCKING MACHINE.

The machine shown in the accompanying engraving was designed by the manufacturers, the Brown & Sharpe Manufacturing Company, of Providence, R. I., to meet a want long felt in their own works—a ready and convenient method of chucking counter-shaft pulleys and other work of similar character. The revolving table is driven by a five-step cone for a 3 inch belt, and is geared six to one, which gives it great power. The steps of the cone are so graded as to make the cutting speed uniform for five different diameters of holes. The turret head has four holes, 1 3/4 in. in diameter, and is securely clamped in position. An adjustable dog allows the locking pin to be withdrawn at any part of its upward motion. The turret slide has a movement of 21 inches, and is provided with an automatic feed, which can be easily and quickly changed from the finest ever needed to the coarsest required. It has a quick return by hand, and is counterbalanced by a weight inside of the column.

The machine will take a pulley 36 inches in diameter, 18 inches face, and hub 12 inches in length; and to bore a 4 inch hole in same, making two or three cuts, and finish by reaming, can be done without removing either the tools or work.

It is evident that with this machine much more work, and of a superior character, can be accomplished in a given time than can be done upon an engine lathe. The work can be more easily trued and secured in place than upon any machine having a horizontal spindle, and the different tools in the turret head can be readily brought into operation in succession. The chips fall through the center of the spindle of the revolving table to the floor, causing no trouble by clogging of reamers, etc.

Protection against Yellow Fever.

In a letter dated May 26, 1886, addressed by Dr. Domingos Freire, of Rio de Janeiro, to Dr. Joseph Holt, President of the Louisiana State Board of Health, the following interesting statement is made:

I have performed over 7,000 inoculations with full success; the immunity was almost absolute, notwithstanding the intensity of the epidemic this year. More than 3,000 persons who were not inoculated died of yellow fever; while among the 7,000 inoculated, inhabiting the same infected localities, subjected to the same morbid condition, but seven or eight individuals, whose disease was diagnosed as yellow fever, died. It is hardly necessary to say that I have taken notes of but one of these cases. My confreres here have the abominable

habit of not giving notice of the fact until after the interment of the individuals, and consequently accuse me of being unsuccessful. You therefore see that, in spite of all this bad will, my doctrine comes out victorious once more by the test of this year, when the epidemic characterized itself by energetic intensity of infection and contagion.

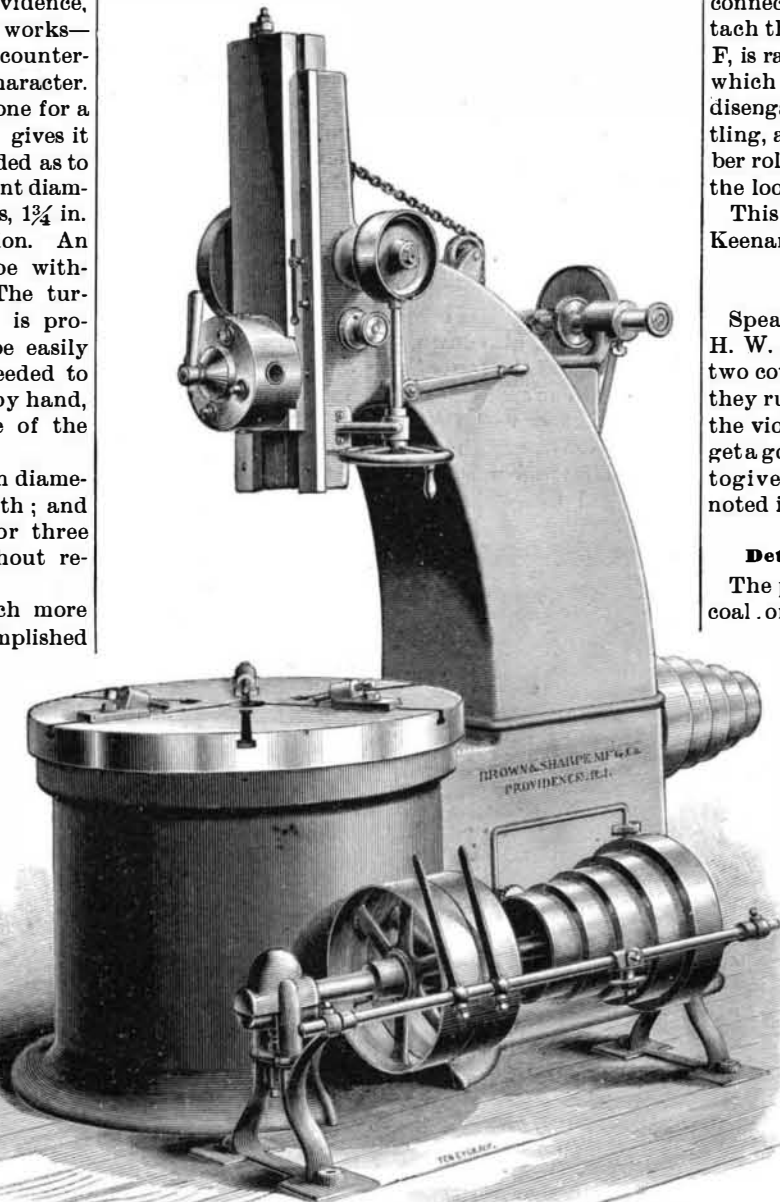
Oil, Albuminoid Matter, and Starch from Corn.

In the manufacture of starch, corn is steeped in water, and kept at a temperature favorable to promote fermentation and putrefaction, for the purpose of loosening the cellular tissue, and to liberate the starch granules as well as possible. In order to accelerate this process, an addition of a small quantity of alkali, preferably caustic soda, is generally made, while other manufacturers, for the dissolution of the inter-cellular matter, prefer the use of dilute acids, especially sulphurous acid.

After 24 to 40 hours' standing, the steeped corn is reduced to a pulp by grinding, from which the starch is then obtained by brushing through sieves and an elaborate process of floating and settling. In the spent liquors remain dissolved the soluble parts of corn, such as gum, sugar, albuminoid substances, gluten, salts, etc., which hold in emulsion fatty and resinous matter, and also suspended cellular and other insoluble matter.

It is this milky liquid to which the inventor, Dr. F. V. Greene, of Philadelphia, applies his process. The liquors are mixed with a small quantity of a solution of sulphate of alumina, which renders insoluble the albuminous substances (for the larger part). These in coagulating envelop and precipitate the fatty matter, as well as the coarser particles, so that the liquor, after settling, is left almost clear. The precipitate is separated by subsidence or filtration, and pressing, and after proper drying forms a grayish coarse powder, the by-product of starch factories, as intended by the inventor. The same treatment is also proposed for the residues of distilleries and vinegar factories.

From the dry product, the oil may be obtained by pressure, or by extraction with benzene or bisulphide of carbon, and the exhausted residue is proposed as a fertilizer for the sake of its nitrogenous matter. Mr. Trimble found 4.26 per cent nitrogen in a sample; while Mr. Haines found 4.75 per cent in another sam-



VERTICAL CHUCKING MACHINE.

ple of this exhausted residue, which amount the inventor expects to increase to 8 per cent by improved operations. The quantity of oil obtained is reported by the inventor as being about one-tenth of the dry precipitate.

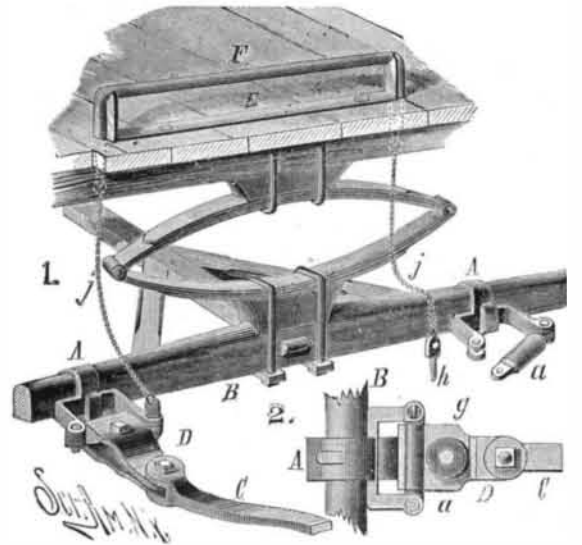
The oil, which in its crude state is dark colored, has a good body, and is capable of bleaching. After all

odor of the remaining extracting medium (hydrocarbons or bisulphide of carbon) is dissipated, the oil has a very agreeable flavor of its own. Undoubtedly, it would make a very satisfactory soap stock.

The drying of the precipitate, which, in its nature, must be very bulky and pasty, will undoubtedly be somewhat difficult and expensive; considering, however, that the waste waters will by this treatment at the same time be disinfected, the process would be a great boon to the whole community in removing a public nuisance—putrefying waste waters of starch factories. —Franklin Journal.

HORSE DETACHER.

Each of the clips, A, secured to the axle, is provided with a swinging bolt, a, whose free end is held by a



KEENAN & GARDNER'S HORSE DETACHER.

pin, h, between eyes formed on the ends of the other arm of the clip. The thill iron, C, is made with a forked eye to receive a loop, D, through which passes the swinging bolt, a. Between the sides of the loop and in front of the bolt is journaled a rubber roller, g, which holds the loop into close engagement with the bolt. To the floor of the wagon is secured a rest, E, for the rod, F, to the bent ends of which are secured chains connected with the pins, h. When it is desired to detach the horse—as in the case of a runaway—the rod, F, is raised, thereby drawing the pins, h, from the bolts, which turn on their pivots and release the loops, thus disengaging the thills. The rubber roller prevents rattling, and when the swinging bolt is released the rubber rolls along the bolt and facilitates the release of the loop.

This invention has been patented by Messrs. C. H. Keenan and J. P. Gardner, of Fort Halleck, Nevada.

Musical Fishes.

Speaking of the musical perch of the Ohio River, W. H. W. says: "The humming or singing is produced by two corrugated bones in the mouth or throat, which they rub together, and the sound is on the principle of the violin or musical glasses. I intend as soon as I can get a good specimen to dissect, or have it done, and hope to give you an item, as I do not think it has ever been noted in any work or paper."

Determination of the Caloric Power of Fuel.

The process consists in burning one gramme of the coal or fuel in a small platinum crucible, supported on the bowl of a tobacco pipe and covered by an inverted glass test tube, through which is passed a stream of oxygen while the whole is placed under water in a glass vessel. The oxygen is fed into the test tube by a movable copper tube, which may be pushed into the test tube so as to come immediately over the crucible. The coal burns away in a few minutes with very intense heat, and the hot gases escape through the water—the bubbles being broken up by passing through sheets of wire gauze, which stretch between the test tube and the walls of the vessel containing the water in which it is placed. The temperature of the water is taken before and after the experiment, and from the figures thus obtained the heating power of the coal is calculated.

THE Agricultural Department at Washington has just sent out large quantities of the eggs of the silk worm by mail to all parts of the country. It has now been satisfactorily demonstrated that the leaf of the Osage orange makes as good silk as that of the mulberry, and that the worms will feed upon it and thrive. The Department is in receipt of letters from girls in various parts of the country, saying that they have made from \$20 to \$100 by raising silk in this way.

Cast Iron Beams.

Absolute strength in the iron of large castings is of little consequence unless they cool, after pouring, in such a manner as not to leave them subject to considerable internal strains. We know that the late Professor Hodgkinson found that with the iron he experimented upon the compressive strength was six times that in tension, and hence that the bottom flange of a cast iron girder should have six times the sectional area of the top flange. But very few, if any, engineers adopt such a proportion, as the casting would, in all probability, crack in cooling. Most of my audience have seen the cast iron bridge over which the London and North-western Railway crosses the Regent's Canal. The first girders for this bridge were cast at the Tinsley Park Works. The iron made there was very hard; and I have been told by my friend, Mr. Shanks, who was engaged there at the time, that it would chill to a depth of two inches. It was used, among other things, for making rollers to roll steel.

The Regent's Canal bridge drawing was sent down there, and they made the patterns and cast the girders. They broke through and through in cooling. Then they altered the patterns, and by pulling off the sand from the thicker portions of the castings, so as to equalize the cooling, a number were cast with the loss of one out of every six. At last, six were sent up to London, and of these every one broke in a thunderstorm. Other girders were then cast of different form. Castings, overstrained in cooling, are apt to break under even a moderate degree of vibration; and the late Mr. Rastrick, once of the Bridgenorth Foundry, and afterward Engineer-in-Chief of the London and Brighton Railway, once stated in evidence how a number of cast iron boilers he had made cracked open after a peal of thunder.—Z. Colburn.

CENTRAL POWER LOCOMOTIVE.

There is now being tested upon the Erie Railroad a locomotive of uncommon appearance, built by the Rogers Locomotive Works after designs by the inventor, Dr. Christian Raub, of this city. The four driving wheels upon each side are united by a rod, connected at the center to a wrist pin, placed upon a disk crank on the end of a shaft journaled between the middle wheels. The cylinders are placed vertically in line above the ends of this shaft.

The two return flue tubular boilers are placed end to end, with the fire boxes adjoining each other. Upon each side of each boiler is a fire door, so that each furnace may be fed from either side. The boilers are united by a tube to equalize the steam pressure, and one safety valve answers for both. There are 132 two-inch flues, 66 inches long, in each boiler. The fire box of each boiler is 56 inches long by 33½ inches wide, and from the grate bars to the crown sheet is 42 inches. The grate surface is 13 square feet, the flue surface 370 square feet, and the total heating surface 420 square feet. There are six water tanks, three at each end of the locomotive, having a combined capacity of 2,000 gallons. At each end are also two coal boxes, each holding three-quarters of a ton.

The cylinders are 16 inches in diameter by 24 inches stroke. The drivers are 62 inches in diameter. The extreme length of the engine is 40 feet, of the wheel base 19 feet 5 inches, and the height from rail to top of cab is 13 feet. The engine is so proportioned and arranged that each half of the total structure, whether divided longitudinally or laterally, is an exact counterpart of the other half, both as regards weight and measure. The consequence is that the center of gravity is at the intersection of the longitudinal and transverse center planes of the entire locomotive. The motive power is placed in the central transverse vertical plane of the engine.

The boiler flues terminate in a smoke chamber at the ends of the locomotive, but, instead of allowing the heat and gases to escape through smokestacks at the ends as in the ordinary locomotive, they are conducted through return flues of a larger size to a smoke chamber, from which leads a stack standing in the center of the locomotive.

The engine shown in the engraving was designed for heavy work, and as it has no dead weight, its entire power can be utilized.

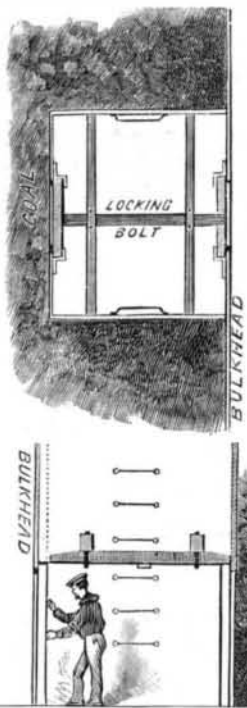
Reward Offered for a New Invention.

The mining owners of Ostraw Rarwin (Austria) have decided to offer a prize of 1,000 ducats for the best invention for preventing accidents in firing and blasting in dusty or gaseous coal mines, or rendering the operation harmless. The invention should fulfill the following conditions, namely: 1. Its use, effects, or explosion should not cause the coal dust to ignite. 2. It should not produce, after the explosion or use, more injurious gas than through the methods heretofore employed. 3. No specially difficult, dangerous, long

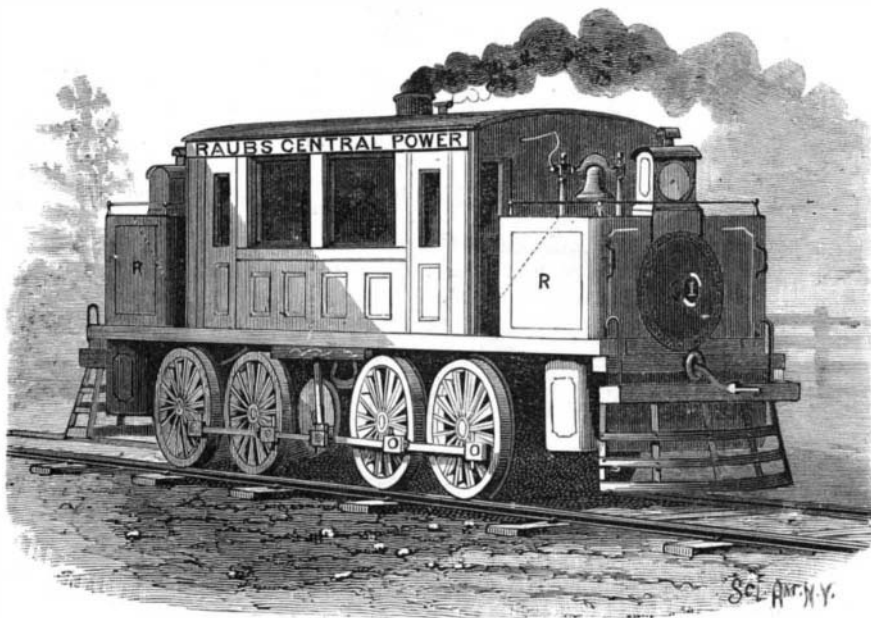
preliminary arrangements or complicated apparatus should be required in using, setting up, loading, transporting, or lighting. 4. Should not by its use and result be much more expensive than the former blasting methods. Applications should be sent before the end of 1886 to the K. K. Berghauptmannschaft at Vienna.

SAFETY BULKHEAD DOORS.

The cut illustrates an arrangement of bulkhead doors for steamers. For the safety of ships provided with watertight collision bulkheads, it is imperatively necessary that dependence should not be placed on firemen and stokers for closing the doors. It seems clear that had the bulkhead door of the Oregon been closed before the collision occurred, that ship would

**HEILL'S SAFETY BULKHEAD DOORS.**

still have been afloat. By the construction shown the doors cannot be left open, even when the coal passers are at work. The door in the bulkhead, instead of entering into the coal bunker, has a chamber or well (built watertight) in front of the door of the bulkhead. This well has a second door fitted in it the same as the other one, both doors to slide easily up and down, and a locking bolt is carried on guides on a level with the top of these doors when they are shut down. This bolt extends exactly from the back of the one door over the top of the other door, and it always bears against the back of the door that is up, and extends over the top of the door which is down. It is thus clear that so long as one door is open the other must remain shut until the other door is also down, to permit the locking bolt to slide from off the top of the one door over that of the other. The coal trimmers bring the coals into the compartment or well, they close the open door, slide the bolt over it, and then open the other. All may be done in a few seconds, even by manual effort, and in less if aided by steam or water. No space is lost, as

**RAUB'S CENTRAL POWER LOCOMOTIVE.**

the well is filled with the coal first used. Steps are fitted inside the well to the deck to provide means of exit. Dearly bought experience proves that no reliance whatever can be placed on firemen or trimmers to shut the doors, as they regard it as unnecessary tyranny to be told to shut them when they are so soon to be opened again, and they consequently shirk it on all occasions.

This interesting invention is due to Mr. Laurence Heill, C.E., of Glasgow, Scotland. He refuses to patent his invention, preferring to dedicate it to the service of the public. It really seems as if it would operate as an insurance against sinking and be a factor in the rating of a ship comparable to the bulkhead itself.

The Latest Summary of Pasteur's Work.

Up to April 14, Pasteur has inoculated 688 persons, presumably bitten by mad dogs, with only one death. He had also inoculated 19 Russians bitten by a mad wolf. Of these 19, 3 have died from hydrophobia—about 16 per cent. The usual per cent of deaths from the bites of mad wolves is said to be about 67. Since April 14, Pasteur has treated other Russians bitten by mad wolves and mad dogs. One of the former recently died from the effects of his wounds; one of the latter from hydrophobia, after having been submitted to treatment. This makes in all 720 cases treated, with a total of 5 deaths from rabies, despite treatment. Pasteur has found that the rabies resulting from wolf bites is the same as that of dogs, and only more dangerous because the bites of wolves are more numerous and severe.

Unprofitable Customers.

Almost every machine-shop owner has suffered more or less from the friend who drops in to have a rivet put in his knife, the spring of his pistol fixed, or some other one of the million little odd tinkering jobs done. Of course, he does not expect to pay for it, "it is such a trifle, you know," nor does the proprietor like to make a charge, and thereby lay himself open to being thought "small." When a charge is made, it is seldom commensurate with the cost of doing the work, and rarely, if ever, pays for the annoyance and diversion from more important work. Such jobs, it is safe to say, are always distasteful, but the proprietor does not know exactly how to refuse to do them. Not only do they take more time than would be supposed, but considerable time is wasted in getting back to regular work, and in many cases other employes have to wait on the one doing the job, machinery is idle, and the minds of the men have to go back and gather up the threads of the work in hand. Such jobs are an imposition, not intentional perhaps, because those imposing them are ignorant of the annoyance they cause, but this does not lessen their cost in any measure. The machinist who does not want such work should plant himself squarely against it, and refuse to take it at all. A few words of explanation would satisfy any reasonable applicant.—*Industrial World.*

Testing Watertight Compartments.

Warned by the fate of the Oregon, the Russian Government, says *Engineering*, has been inaugurating an exhaustive test of watertight compartments, which it contemplates applying to all new vessels, and probably to older ones as well. The man-of-war selected was the corvette cruiser Vitzia, which was finished last autumn, and is under sailing orders for the Pacific this month. Five weeks ago an intimation was conveyed to the dockyard authorities at Cronstadt that the watertight compartments would be tested in succession, and instructions were given to survey them afresh, and make good any defects that might be discovered. If the official report is to be believed, every effort was made to meet the wishes of the Admiralty, yet when the compartments were actually filled with water the fluid gushed through numerous apertures which had escaped the eye, and in some cases to an extent which would have been troublesome at sea after a serious accident. To secure perfection several of the compartments were filled two or three times, and it was only after a deal of door adjusting and leak stopping that the corvette was pronounced fit to proceed to sea. A final test was then applied in the presence of the higher Admiralty authorities, a number of the nine large watertight compartments being filled at once without any leakage. Besides insuring the rectification of all defects in the watertight compartments, it is claimed in the report that the tests have proved of great service in training the crew; they have promoted confidence in the buoyancy of the vessel, and have led to several improvements of an important character. It has been suggested that in this year's naval maneuvers in the Baltic the tests should be continued by ordering so many of the watertight compartments to be filled, in the event of a torpedo cutter approaching within hitting distance of a man-of-war; but the defects revealing themselves in the case of the Vitzia have made the authorities apprehensive of ill results, unless harbor tests are applied beforehand.