The Detroit River Problem.

A board of engineer officers, under orders from the War Department, have been making inquiries with regard to the proper means of solving the transportation problems that have arisen at Detroit, Mich. Briefly stated the difficulties to be overcome and the interests to be reconciled are these:

At Detroit two immense streams of commerce come into direct interference, namely, one by water and the other by railroads. The problem before the Board was to soarrange by either bridge or tunnel that these might cross each other with the least injury to both, and in such manner as to accommodate the railroad traffic, and at the same time do no material or undue injury to the interests of navigation. The magnitude of these conflicting interests at this point may be realized from official statements, which show that the number of vessels of various kinds passing Fort Gratiot lighthouse during the fiscal year endiug June 30, 1879, was 22,150, and that the business of the railroads crossing the river at Detroit during the year 1878 was as follows: 129,113 passengers, 12,258 passenger cars, 3,873 baggage cars, and 104,359 freight cars.

The board are unanimously of the opinion that a tunnel under the river offers the most complete solution of the problem. They, however, indorse the bridge plan conditionally. A former board of examiners reported against a bridge project which contemplated draw openings of 166 feet. The present board regard a bridge more favorably in consideration of the facts that draws of more than 200 feet have been since constructed, and that it is now proposed by bridge builders of high reputation to construct them with openings of 300 feet on each side of a pivot pier, or of 400 feet between two pivot piers. With such a bridge they hold that with the present traffic there will be ample time during the intervals between the passage of vessels to move all trains across the bridge. There will occasionally be delays, but the railroads can accommodate their time tables to compensate for any ordinary delays. They say, however, that in case authority to construct a bridge should be granted by Congress it should be distinctly provided that vessels have the right of way, except when moving trains are passing over the bridge.

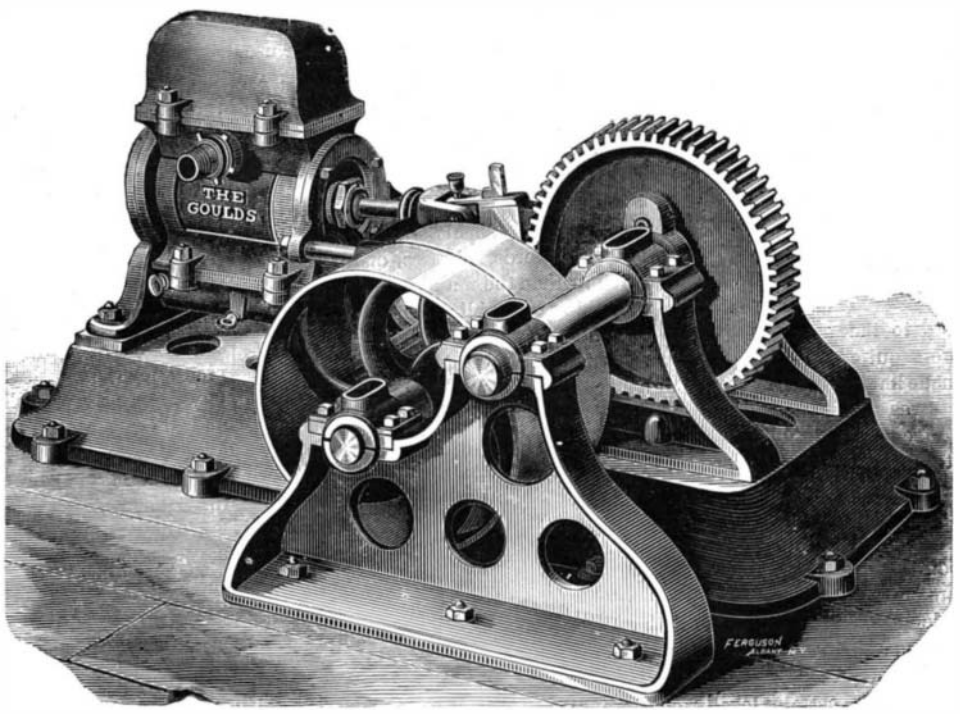
Cotton and Corn.

The report of the Department of Agriculture as to the condition of the cotton and corn crops, Dec. 15, shows that owing to favorable weather in all parts of the cotton belt the crop will be somewhat better than was previously reported. Imperfect ripening in some of the Northern States slightly reduces the average yield of corn per acre. The figures still leave the corn crop larger than that of any previous year by 150,000,000 bushels. The States and Territories west of the Mississippi River return over 100,000,000 bushels more than in 1878.

HORIZONTAL DOUBLE-ACTING FORCE PUMP.

We give herewith an engraving of a very substantial and efficient force pump made by the well known Goulds Manufacturing Company of Seneca Falls, N. Y. It is intended for feeding boilers, elevating water, and for other purposes requiring a first class pump.

The working parts of the pump are all brass. The cylinder is brass lined, and by unscrewing the brass nuts at the side, both the upper and lower valves are accessible, without disconnecting either the suction or discharge pipes. The gears are cut, and are six inches and sixteen inches diameter respectively. The relative sizes of these gears may be changed if desired, arranging them so as to work against a very heavy pressure, or to run faster, against lighter pressure. The connecting rod has strap joints with gib and key, and with brass boxes. The crosshead runs on two substantial guides, taking all the lateral pressure from the stuffing box and piston, and at the same time forming a brace from the pump cylinder to the pillow blocks. The pulleys are eighteen inches diameter and five inches face, and have an outside bearing. The frame is all cast iron (weighing over 700 lb.), very heavy and strong, occupying a space five feet long by two feet three inches wide—at the pulleys three feet three inches wide. The whole pump weighs about 1,000 lb. The pulleys may be run at from 120 to 160 revolutions, which would give 90 to 120 strokes of pump respectively. For continuous work the less speed is the best for the economical working of the pump. When used for fire protection it may be run at the higher rate of speed.



THE GOULDS DOUBLE-ACTING FORCE PUMP.

A Use for Blast Furnace Cinder.

The following method of utilizing blast furnace cinder in jacketing steam pipes is recommended by Mr. Franz Buttgenbach: Mix 150 parts of cinder dust, 35 parts by weight of fine coal dust, 250 parts of fire-clay, and 300 parts flue dust, with 10 parts of cows' hair, add 600 parts of water, into which 10 or 15 parts of raw sulphuric acid has been poured, and make a stiff dough of the whole. This is thrown in small amounts upon the warmed pipe, hardening rapidly. Upon this rough coat a second, third, etc., is laid, according to the thickness which is to be used. By the action of sulphuric acid, gypsum is formed, and the silica, rendered free, hardens. The mass becomes as hard as porcelain, and is still porous It adheres firmly, and never cracks. Mr. Buttgenbach states that he has tested its merits by ten years' use, and has found it to meet all requirements.

GOPHER AND ANT DESTROYER.

The California ground squirrel, commonly known as the gopher, is a great pest to the farmer, destroying enormous quantities of grain and doing great injury to gardens and orchards. The cutting ants which infest many of the Southern States and parts of California and Mexico, and the moles which are found in various parts of the country, are all enemies to the agriculturist, and destroy millions of dollars' worth of crops every year.

MELCHER'S GOPHER AND ANT DESTROYER.

The accompanying engraving represents a novel and effective gopher and ant destroying apparatus, patented by Mr. John C. Melcher, of O'Quin (Black Jack Springs P. O.), Texas. It consists in a fire chamber, having around the bottom a sharp flange which cuts into the ground around the ant or animal hole, forming a tight joint. The fire chamber has an air space under the grate, which communicates with the air forcing pump through a short section of flexible tube. An internal pipe extends from the bottom of the fire chamber upward to convey the poisonous fumes from the top of the chamber down into the chamber formed by the flange.

A fire having been made in the fire chamber, the poisonous compound is dropped in upon it, and the opening in the top of the chamber is closed. The air-forcing machine being started, all of the smoke and poisonous vapors are forced down into the hole, killing everything animate with which it comes into contact.

The Need of Mechanical Industries in the South.

Commenting upon the general need of new industries in the Southern States, the New Orleans *Times* says:

One often hears the remark that the South is slow to take up manufactures which will, undoubtedly, add millions to her wealth, and provide employment for thousands of hands that now perforce are idle. But it must be remembered that, previous to the civil war, the attention of the Southern people was concentrated upon agriculture, which paid, or was supposed to pay, a magnificent profit. The war demonstrated better than anything else could have done the inherent weakness of a people whose entire reliance is placed on one branch of industry. The growth of Southern manufactures has since been slow but steady.

In looking around one finds innumerable articles which were formerly imported now made at home. The magnificent machinery used to take off the sugar crop is now made in New Orleans. And the same is true of many other branches of industry. Cotton manufacturing now, for the first time, comes forward under really favorable auspices, and it is not unreasonable to suppose that it will progress as similar industries have done.

New Orleans has a large population which could furnish the very best class of skilled labor. Our people have all the aptness and taste which they inherit from the Latin race. The great problem we must face is how to convert this large mass of people, who are idlers from the force of circumstances, into bread-winners, adding health and vigor to the community.

A Rise in Rubber.

Owing to reports of a partial failure of the rubber crop of Brazil, and the clever management of speculators at Para, the price of rubber was forced from 50 cents to one dollar a pound during the second week in December. During the excitement it is said that in one day several houses in New York and Liverpool bought 2,000,000 lb. of rubber at prices ranging from 75 to 80 cents a pound. Though the report of a short crop was strenuously disputed the price continued far above its natural level. The Para district produces about half the rubber crop of the world, or from 15,000,000 to 18,000,000 lb., the other half coming from Africa and the East Indies.

ENGINEERING INVENTIONS.

Mr. Seth C. Doyle, of Harrisonville, Mo., has patented an improvement in the class of couplings in which a swinging link is raised and held in horizontal position for engagement with the drawhead of an opposite car by means of a lever which is attached to the same car as the link.

Messrs. James B. O'Donnell and William J. Dever, of Hazleton, Pa., have patented a brake that can be easily applied to coal or freight cars, gondolas, oil cars, and the like. It is operated by the contact of one car with another.

Mr. Gustave J. Crikelair, of New York city, has patented an improved apparatus for elevating water above the height to which it would naturally rise, by the combined action of gravity and compressed air.

An improved water elevator, patented by Mr. Robert M. Catlin, of Tuscarora, Nev., relates to apparatus for raising water by compressed air, and the apparatus is especially intended for use in mines as a substitute for pumps. The use of pumps for that purpose is open to many objections and disadvantages, such as loss of power from friction, and by reason of the distance the plungers are placed from the motor, the disarrangement of valves and other mechanism, and the cutting out of the piston heads and cylinders by the grit contained in the water.

Mr. Samuel S. Burt, of Marquette, Mich., has invented an improvement in elevated railways. It pertains, first, to securing the track rails upon ties which are so constructed that their ends are made elastic, thus adapting them to yield when a train passes over the road. The manner of construction adopted to secure the requisite elasticity is to slot the ends of the ties and insert rubber blocks between the posts separated by the slot.

Mr. John M. Cayce, of Thompson's Station, Tenn., has patented a motor designed to operate without weights, springs, magnetism, or expansive gas, which he calls the "hydro-buoyant motor," for the reason that it takes advantage of the buoyant value of a float contained in a body of water. It consists in arranging the float in a receptacle filled with water in such a manner that the float is free to rise, and in rising shall communicate its power to extraneous mechanism, the operation being made continuous by reversing the position of the receptacle containing water, which gives a renewed position to the float, from which it may again rise.