Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

Steam on Canals.

MESSRS. EDITORS:—I would like to suggest a few plans which are applicable to this purpose:

1. A long screw fixed to the bottom of the boat and run by steam or other power.
2. A common paddle wheel placed at or near the center, and run by steam or other power, as above mentioned.
3. A screw fixed and run as the wheel last mentioned.
4. Glenn's patent device, mentioned in Vol. XIX. No. 6, new series of the SCIENTIFIC AMERICAN. G. MANUEL.

Napa City, Cal.

MESSRS. EDITORS:—As the subject of steam canal propulsion is now attracting considerable attention, induced, no doubt, by the large reward offered to him who succeeds in devising a practical machine for that purpose, it may be well to give a brief outline of several experiments which we tried on the Harlem river in 1857. The apparatus consisted at first of a single lever pushing from the stern of the boat, which was worked by a hand lever. This plan was afterwards altered to four pushing rods, a pair working alternately on each side. This device propelled our boat at the rate of six miles an hour, making scarcely a ripple on the surface of the water. The boat was twenty feet long and five feet wide; the engine was of two horse power. The results were very satisfactory, and would have been continued to ultimate success, had there been inducements such as are now offered for solving the problem of steam canal navigation. The similarity of our contrivance to that of the traction engine, which Mr. McKenzie says in a recent issue could be made available for canal propulsion, has prompted us to briefly make known our experience in that direction, as the description of the mode of working the traction engine seems identical with ours. WILLIAM GUILFOYLE.

New York city. B. P. FINNELL.

MESSRS. EDITORS:—One hundred thousand dollars for a new propeller for use on the canals seem quite a liberal offer. But it is hedged about with restrictions that are likely to defeat the object. As I understand it, the conditions are that the inventor must test his invention at his own expense. Now, as most all new inventions require considerable experiment, the inventor must needs have about ten thousand dollars ready to invest, a sum seldom found together with brains to originate such an invention. At any rate, it does not give the poor mechanic the same chance as his wealthy neighbor. Now, to give all an equal chance, could not the State afford to spend ten thousand dollars in experiments, rather than any individual? Of course this should not be done until the committee appointed should select the best plan submitted to them for inspection. Then if the invention proved successful, they might retain the amount, used for experimenting, from the prize offered.

If the Legislature shall so amend this act, I have no doubt that the invention desired will be forthcoming. Should no invention which would commend itself as practicable to the committee be submitted, then the State would be at no expense, and a number of individuals would be saved the expense of experimenting. JOHN BAMBER.

Rochester, N. Y.

[We see no objection to the law being amended as our correspondent proposes. As it now stands, however, there will not be much difficulty, we think, in enlisting capital to practically test such plans as promise well.—EDS.

The Erie Canal and its Improvements.

MESSRS. EDITORS:—Your remarks about the practicability of steam towage on the canal, recall the speculations of men who are interested in our canal commerce, and for nearly half a century have been engaged in it.

As you truly say, it is needless to think of any other motive power than steam; other powers may, in the process of time, be discovered, and found to answer a better purpose than steam; but it is steam only with which it is best to experiment. To speculative mechanical philosophers we may leave the subject of applying other as yet untried and undiscovered powers. To steam, and steam applied to the screw, it is best to limit our experiments, and it would seem that no better agent, or application of that agent, is at present worthy of consideration, or, for that matter, to be desired.

With canal boats of the size now in use (220 tun boats), with their absurd models, steam power is not desirable. The machinery takes from the boat too large a proportion of its carrying capacity, and, owing to the box-like model, close fit in the locks, and excessive draft (leaving but six inches of water under its bottom in the canal), a speed of more than two miles per hour is not practicable, so that, on the whole, animal towage, with such boats, is likely to hold its place.

What has got to be done, if any improvement is effected in canal carrying, is this: The locks on the canals have to be reduced in number, by increasing their lifts, and making a double set of them, say, 220 feet long, and 27 feet wide, with 8 feet draft of water. With locks of this size, the boats should not exceed in length 200 feet, and in width 25 feet, with a draft of 6 feet. Such boats will carry 600 tuns, besides their engines, etc., and can readily be passed through the locks. Their models should be prescribed by law, so that they would run easily through the water.

Well modeled boats, with abundance of power, might be relied upon for five miles per hour in the canal, and eight or nine miles in the Hudson river, making the passage from Buffalo to New York in about four days, ordinarily, giving time for lockages.

Instead of lining the banks of the canal with hydraulic cement, stone walls of rubble, perhaps laid in cement to high water mark, would be cheaper and better; and, considering that a large part of the canal is now walled up with stone, would not entail much additional expense.

It might, perhaps, be thought best to add a foot to the present depth of the canal, after the locks should be enlarged—not a very expensive work—and, here and there, an addition to the width of the prism, in its most thronged parts.

The question of supply of water would next arise. Of its sufficiency, there is no doubt, for at all times there is a large amount of water passing from one level to another; but, if thought best, the number of reservoirs could be increased, at an inconsiderable expense.

With the improvements suggested, the Erie canal would literally become a river, and with its steam vessels of 600 tuns, would secure our State and New York city forever against any rival route, or mode of transportation. If some such improvement be not adopted, the canal might as well be filled up at once, for it is fast losing its commerce.

Buffalo, N. Y. FORWARDER.

Steam Towage.

MESSRS. EDITORS:—An experiment in navigation was tried on the lakes last year, and continued this season, which may yet become of great importance.

From time to time, for six or seven years, as one after another of the great passenger steamers on these upper lakes became unprofitable, in consequence of railroad competition, the valuable engines were taken out of them, and sent to the East and sold, and their hulls converted into barges for carrying lumber, being towed through the lakes by powerful tugs. These vessels were profitable, carrying very great loads and as many, sometimes, as two or three of them were taken by one tug and towed, in all states of the weather, for distances of six or eight hundred miles.

The success of those vessels was such, that others engaged in the transport business, have, of late years, had built large barges, new and strong, for carrying of iron ores, etc.

Last year, as is stated above, a gentleman here had built a great tug of 1,200 tuns, with corresponding power, two low pressure engines, with 42 in. cylinders, 100 lbs. pressure of steam, and two barges of 1,500 tuns each, for the grain trade; and all three, tug and barges, carry successfully from Chicago to Buffalo 140,000 bushels of wheat—4,200 tuns, dead weight.

This tow, as it is termed, makes, on an average, ten miles an hour, in all weathers. Now and then time is lost in very bad weather, but they do as well as other vessels, without tows.

The barges carry about eight men and boys, all told; they have each three short spars, with fore and aft sails, of very heavy canvas, as easily handled as a pilot boat, though they carry their 1,500 tuns; their tow line is a steel wire rope, which cannot (practically) be broken.

Is not this fact one which is worth commenting on in your journal? and why cannot this system of towage be introduced on the Atlantic, first for coasting, and eventually for transatlantic voyages?

The cost of transportation or freighting by tows is said to be about half what it is by sails or steam vessels, so that freighting by towing, at the nett cost of what it costs sailing or steam vessels, pays a large profit. So says rumor.

Buffalo, N. Y. FORWARDER.

Invention versus Discovery.

MESSRS. EDITORS:—On page 324, current volume of the SCIENTIFIC AMERICAN, I find an interesting article entitled "Some Useful Suggestions," in which, after giving some valuable hints, the writer concludes as follows: "I have no opportunities to experiment in any device, but if my suggestions should prove new and valuable, I hereby give notice to the patent examiners that I claim them as mine: and if you print this, they will have been published in a public journal, and no one can claim them."

I hold, Messrs. Editors, that the end and aim of all good men is to benefit their race; and the writer of the above, with many thousands of other good men, believes that a valuable idea should be used by mankind free from all claims of royalties to the discoverer. In this I am perfectly willing to concur. But the question arises, can the world be benefited by simply advancing crude ideas?

Supposing that the writer's object be fully secured, and the patent law excluded all persons from using the ideas and reducing them to successful application, would not the result be rather a loss than a gain? Who would spend time, labor, of money, in making the experiments which your correspondent has no opportuuity of making, if no reward could be gained? Suppose that a law existed by which all precious metals (when suggested to exist in a certain locality by the learning of some geologist, and the suggestion were "published in a public journal"), all gold or silver mined should be public property? Would men mine? Would they expend time, labor or money? Would they risk their lives to bring the precious metals to light, smelt and coin them so that they might easily be divided among their fellow men? I, for one, doubt if such generous men could be found.

Much stress is laid upon the fact that scientific men freely, without charge, give up their discoveries to the world. Yet I find that when Liebig, after giving us the discovery of his *Extractum Carnis*, experiments on its production on a large scale, he secures to himself a portion of the benefits to reimburse him for his outlay. And yet Baron von Liebig has experimented on giving some of his valuable discoveries free to the public, but soon found that the people were not benefited as he wished. For instance, his malt sirup, for which he published the receipt, was made by druggists in such a manner that it failed to have the properties which its discoverer claimed for it, and Liebig was compelled to publish the names of two or three chemists who made it under his special supervision. Professor Horsford has given to science many valuable discoveries, but when he invented his self-raising bread preparation, nothing but the security of a patent could have brought its benefits into every household.

When a scientific traveler in South America finds a plant resembling our domestic potato, I can understand how he would examine the same, test its quality, and publish the discovery to the world free of charge. But when a farmer has plowed his field in early spring, bought the seed, hoed, tended, and watched the plant, would you ask him to cart his potatoes to the nearest city and divide them among its inhabitants? It is the same with inventions. The true inventor does not carry an idea to market, but furnishes the world with the practical and useful application of concentrated thought, observation, and experiment. Believing in the security of the patent issued to him, he spends his time, labor, and money for the benefit of mankind, hoping to receive a small share of the general benefit, to reward him for labor and anxious care, which none can appreciate who have not, as your humble servant has, spent the best part of an active life in the cause. JOSEPH A. MILLER.

Boston.

How to Further the Cause of Temperance.

MESSRS. EDITORS:—On page 308, current volume of the SCIENTIFIC AMERICAN, is a communication on temperance, from "Humanity." You are in favor of improvements, and I am glad you do not exclude this kind, for it is much needed. "Humanity" is right as far as he goes, but it is no more than half way.

Why not educate the boys in the same way? I don't believe it is harder to keep boys from drinking than girls, if the right course be taken. Let them be taught the fact that all alcoholic liquors are poison, that drinking is degrading and unbecoming to any one; that getting drunk is an attempt to commit suicide (which is true)—let these things, I say, be taught to the boys as well as to the girls, and then there will be something accomplished. Without this, but little can be done.

If every one would take my pledge they would be better off. It is that I will neither make, buy, sell, use, nor give away, nor cause to be used or given away, either as a beverage or a medicine, any spirituous, malt, or fermented liquors, or any other liquors that will intoxicate (that is, that contain alcohol). This is strong, I know, too strong for some; but whoever keeps it need never fear filling a drunkard's grave (except it may be with a shovel), or being troubled with ophidians in his pedal coverings, or even getting any building material in his *chapeau*.

As for alcoholic liquors being used as medicine, I think they are not necessary. Dr. Parson, of Pa., says: "Neither wine, malt liquors, nor alcohol, are necessary for medicinal purposes; there are more harmless agents in the laboratory which have all the virtues attributed to alcohol." Dr. Trall says: "The use of alcoholic drinks always did and always will follow in the wake of alcoholic medication. All the data of science, of experience, and of argument, which can be alleged in favor of alcohol as a medicine, can be, with equal cogency and propriety, adduced in favor of alcohol as a beverage." Dr. Emlin says: "All use of ardent spirits is an abuse; they are mischievous under all circumstances."

Very many of our M. Ds., some of them self-styled, will, either wilfully or ignorantly, persist in using liquors in their practice, and their teachings cause parents to be very slow to disallow the r use. But this is no excuse for them. They should have no scruples about banishing all liquors from their homes, and forbidding their use under all circumstances; but remember that 3 scruples make a dram, 2 drams make one tight, 4 tights make one like to get drunk, and 2 drunks make one—well, a mere animal.

This matter is of interest to mechanics, as well as to the rest of mankind; hence, my writing this to you. That it may do some good is the wish of

Wauseon, Ohio. LEW Q. BRACIAN.

An Ingenious Contrivance.

MESSRS. EDITORS:—Being at Annapolis, Md., a few days ago, I visited the Naval Academy, and saw there a most ingenious and economical expedient applied to make an air pump of an oscillating engine, to drive a working model beam engine, to show and compare the actions of radial and feathering paddle wheels. I learned that this novelty was contrived by First Assistant Engineer, Geo. W. Roche, one of "the highly scientific corps" on duty there under the popular Chief Engineer, Henry Lee Snyder, who is at the head of the Department of Steam Engineering at the United States Naval Academy.

The oscillating engine is run by a belt from the line shafting of the machine shop, backwards, while the valve had the ahead motion, taking the air through the exhaust pipe, and forcing it out, by the action of the piston of the engine, through what had formerly been the steam pipe. The operation is analogous to that of a locomotive engine, which is forced ahead by the momentum of a train, while the valve is operated by the backing eccentric. A locomotive when forced ahead by a train, with the backing eccentric operating the valve, compels the engine to force air into the boiler, instead of taking steam from it, as will be shown any time by the gage under the circumstances. The whole concern is worked by compressed air forced into an iron tank.

Philadelphia, Pa. J. A. CARTER.

How Matches are Made.

A correspondent of the *Mechanic's Magazine* who has been visiting an extensive London manufactory, thus describes it: The factories are situated in the Fairfield road, Bow, and cover five acres of land. There are four distinct branches of manufacture carried on here, namely, that of patent safety matches, which ignite only on the box; that of ordinary matches, of vesuvians, and of wax vestas. Following the order of manufacture, we will first take our readers into the yard where is a series of stacks of spruce timber, selected for its superior quality and fineness of grain. This timber is used for making the match boxes, which, however, are not made on the premises, but afford work to a great number of women and children, principally in the east end of London. Passing by an extensive suite of offices on the right, we enter a large building, which is used for a store for empty match boxes. At right angles to this is another building of similar size, appropriated to a similar purpose; in this and the adjoining store were immense piles of match and vesuvian boxes, besides hundreds of reams of packing paper, and thousands of packets of labels of every kind and pattern. The subjects of these labels are extremely well engraved, and some of them were very tastefully designed.

Quitting the stores, we proceed to the department where the manufacture of the patent safety matches is carried on, which is a very large building. The splints, which are supplied to the works in bundles of 1,900 each, are first prepared by dipping the ends in melted wax. The splints are 5 in. long, double the length of the made matches; the bundles are placed on end upon a hot plate, by which they are slightly charred. They are then dipped endwise in a pan of melted wax, the pan being heated by a steam jacket, and returned by the dipper to the hot plate; a boy reverses them, and the opposite end is then dipped in the wax, which is absorbed by the wood to the depth of about ¾ in. and causes the match to burn freely. One man will dip as many as 1,000 bundles per hour. The prepared splints are then conveyed to machines to be filled into frames for dipping in the igniting composition. These machines have hoppers into which the bundles of splints are fed, the binding string having been cut. The splints are placed in horizontally, and at the bottom of the hopper is a brass plate having a number of grooves, into which the splints are brought from a frame under the hopper, to which a reciprocating motion is given. As the splints fill the plate, they are pushed to the front by a series of needles set in a bar behind the machine. and are received by the attendant on the first bar of a wooden frame, another bar being immediately placed on the splints to hold them in position. This process is continued until the frame is filled, when it contains about 2,000 splints.

From the filling machines the frames are conveyed to the dipping department. The patent composition consists of chlorate of potash and other ingredients for working it into a paste. This paste is spread upon a slab to an even thickness of about ⅛in., and the ends of the splints, which project from one side of the frame, are dipped in it. As the frames are dipped, they are removed to the drying houses. The time occupied in drying the matches varies according to the state of the atmosphere; if the air be damp, the matches may require a day, whilst if it be dry, a few hours will suffice. When one side is dry, the frames are taken back to the dipper and the opposite ends of the splints are dipped, and the frames returned to the drying rooms. When the second side is dry, the frames are taken to the boxing benches, and the double ended matches are dexterously removed from the frames and placed in a pile by the side of the box hands. The operator takes in her hand what she judges will be enough when cut to fill two boxes, and her judgment rarely fails her. The matches are placed in a grooved rest, the center of the handful being placed exactly under the knife, which is brought sharply down, cutting the matches through, the end of the blade being fixed by a pin as a center on which it turns. The operator first seizes one and then the other half of the bundle of severed matches, and places each in a box, a pile of boxes being ready to hand beside her. From the filler the boxes are carried away to another department, where the patent composition is laid on their outsides.

And here it may be as well to explain what to many is a great mystery, namely, how the safety matches are made to ignite only on the box. The secret of this real safety depends simply upon the circumstance that, instead of ignition being produced by simple friction as in the ordinary matches, it is the result of chemical combination, one material being placed on the box and the matches being tipped with another. After the composition has dried on the boxes they are carried to the wrapping room, where a number of girls are engaged in wrapping the boxes in paper and forcing them into parcels. From this room, they are passed on to the packing room, where they are packed in cases for the market or for exportation. In another part of the safety factory are three vertical boilers, which supply steam to the engines which drive the various machinery. They also supply steam to heat the wax for the first, and the composition for the last process of dipping.

There are two buildings in which the ordinary matches are made. The processes carried on in them are much the same as in the patent safety match factory. The ends of the splints are dipped in wax, they are then taken to the frame filling machines, and from thence in the frames to the dippers, and on to the drying room, after which they are cut, boxed, and packed in the same way as the others are. The composition with which the ordinary matches are tipped is of course different from that used for the safety matches, and is prepared in a separate building, their manufacture being much the same as that of matches, with modifications in the dipping process.

The last process we have to describe is that of making wax vestas, which is carried on in another and separate building having three stories. The basement is the manufacturing department, the ground and upper floors being used respectively for boxing and packing the vestas, and for stores. Proceeding to the basement we find the following process being carried out: The balls of cotton forming the wicks of the vestas are placed to the number of twelve in a box with divisions, one in each division. The ends are then attached to a winding drum, about 3ft. in diameter, on which the twelve lengths of cotton are wound. The ends are then passed through a frame having twelve holes and so through a silver trough of melted stearin and paraffin, and fastened to another revolving drum at the opposite end of the building. This latter drum being set in motion unwinds the wick from off the first drum and winds it on to itself, the wick having passed through the trough and taken its first coat of wax. This process is repeated until the surface of the taper is smooth and clear. The winding drum No. 2 is then removed to a cutting machine, where, by an ingenious automatic arrangement the lengths of taper are drawn off the drums, cut into any required length accordingly as the machine is set, and passed into frames ready for dipping. As the frames are filled they are taken to the dipping department and thence to the drying rooms from which they are removed, when the vestas are dry, to the box filling and packing departments on the ground floor. The stearin is first melted in an enamelled vessel, which is steam heated and from which it is supplied to the silver trough. The reasons for these precautions is to be found in the circumstance that the stearic acid acts injuriously upon the baser metals, and vessels made from them are therefore useless. Even the enamel is beginning to be eaten away at some places near the top of the pan.

Such then are the details of one of the most extensive manufactures of the present day, but the full extent of which to be realized, must be seen. Figures can convey no adequate idea of its extent, because it involves so many processes. The annual production of matches is counted by millions, which are scattered over all the known world. The waxed taper, from which the vestas are cut, is made by the mile. The hands directly and indirectly employed by the Messrs. Bryant and May, may be numbered by the thousand, and besides the works we have been describing, they have extensive warehouses in the Mile End road.

How Printing Ink is Made.

It is not very hazardous to assume that a great many persons who have handled printing ink all their working lives had no very clear idea as to how it is made. A vague notion of lampblack and varnish possesses them; but if asked just what ingredients enter into the compound, and how, and in what proportions they are put together, they usually find it difficult to give a satisfactory answer. With the purpose of dissipating the general ignorance as to a point which all printers, at least, should be familiar with, we, says the *Record* (Boston), went out to South Dedham, recently, and took a walk through the famous ink works of George H. Morrill. And a very dirty walk it was too. Lady visitors to an ink factory are advised not to wear their white piqué dresses, and gentleman will do well to put off their white linen suits before before passing the inky portals of the establishment. Another piece of sound advice to visitors is, don't touch the door handles; let your guide, who wears gloves that seem appropriate to his Satanic Majesty's fingers, do that service for you. Keep your hands in your pockets, and retain your coat tail within a limited sphere, and you will come out without serious spot or stain.

There are five separate buildings belonging to the works, the whole containing nearly one million bricks. No. 1 is called the grinding room, 30 by 40 feet and two and a half stories. Here are the Bogardus patent mills for grinding the ink, as described further on. In this building is a water wheel of 35-horse power. No. 2 is the engine room, 30 by 18 feet, containing a steam engine of 27-horse power. No. 3 is the varnish building, 45 by 40 feet, containing 14 set kettles, three of which are each of 1,200 gallons capacity, and one of 1,500. Here are also three mixers of 1,400 pounds capacity. No. 4 is used for the manufacture of oil, and contains two large stills weighing 6 tuns each, 3 kettles holding 1,800 to 1,000 gallons, and a tank holding 3,000 gallons. In building No. 4, the oil is boiled in two large iron tanks. Besides these there are eight lampblack houses, with one oil tank of 20,000 gallons capacity and five of 2,000 gallons. The oil from these is fed through a pipe into furnaces, and then burned, the flame being conducted into the lampblack houses, where the smoke is condensed and forms the lampblack, falling on the floors like a black snow storm.

The essential ingredients of printing ink are varnish and lampblack. The varnish is made by boiling or burning linseed oil, and mixing crude turpentine and gum copal. Lamp black is a fine soot gathered from the smoke of resinous substances. The substance used in Morrill's factory is resin, and a heavy petroleum oil. To the soot gathered from the flames of these is added a certain amount of spirit, on the quality of which depends the fineness of the black.

The varnish and lampblack being mixed, they are put together into mixers, and thoroughly amalgamated; the compound is then run through breaking rollers, and finally through eccentric mills, in which the ink—for it is ink, at this stage—is ground fine. It is then put into barrels and kegs, and is ready for use. Before it is turned into the mixer, the varnish is run through a strainer having 100 strands to the inch—the netting surrounding the sides of the strainer, whose bottom is perforated, so that all dirt and foreign substances sink and pass off, while the varnish passes through the strands, clear and pure. Dirty as an ink factory is, the most scrupulous cleanliness is required in handling and packing the ink—the barrels in which it is put being free from all dirt.

The color of printing ink depends on the quality of the lampblack used in its composition; the working quality depends on the varnish. So that in order to make good ink, the greatest care and skill must be exercised in the manufacture of these ingredients. Most people would naturally suppose all lampblack to be alike and of a uniform hue; but at Morrill's factory may be seen specimens of the substance, which contrast in color as strongly as a heap of sand and a raven's wing. The best lampblack is of an intense and glossy black; the poorest qualities of a dull brown. Many manufacturers use the same quality of lampblack, and a poor quality, in all kinds of ink. Mr. Morrill does not, and in consequence his fine grades of ink are recognized as the very best made in the country. There are secrets connected with his manufacture and manipulation of materials, which have an important bearing on the quality of his product; but these of course, it would not be proper to disclose. His policy, which has been so remarkably successful heretofore, is to use the best materials in the most scientific manner, and to avail himself of the knowledge acquired in long experience to make constant improvements in his modes and processes, and consequently in the character of his ink. He makes inks of various kinds, varying in price from fourteen cents to five dollars per pound. His average daily product is 2,000 pounds; but when the works are run at nights, as frequently happens, this is increased to 3,000 pounds. Extensive enlargements and improvements are now in progress, which will enable him largely to increase his product.

Embroidering by Machinery.

In the early history of almost every manufacture there is nearly always an amount of almost romantic interest that no outsiders would expect from seeing its humdrum or every, day working. This is the case with the recent and comparative new art of embroidering by machinery. In 1827-8 a certain M. Heymann, of Mulhouse, introduced into Switzerland a machine for producing sewing or longstitch embroidery work. A St. Gall merchant advanced sufficient funds for making ten or a dozen such machines; and after the usual changes and improvements, very fair results were obtained. Forty-odd years ago, however, an aversion to labor-saving machinery, even amongst comparatively well educated people, was one of the economical fallacies of the time; It was difficult to obtain labor, and many people conspired to impede the employment of the machines and their products. In the end the St. Gall capitalist lost all his fortune, becoming a bankrupt, while the machinery was taken to pieces and thrown into a heap.

Not less than twenty years later a nephew of this same Swiss merchant conceived the idea of sorting these pieces, and erecting them according to the dim memories of his childhood. After considerable trouble he at last succeeded. With much shrewdness he kept his undertaking secret, sending the embroidered work to foreign markets as hand-made embroidery. By his ability and good fortune he rapidly prospered, gradually increasing the number of his machines, but keeping their construction secret, as patents are not granted in Switzerland. At last his success attracted attention. Others wished to embark in such a prosperous trade; the difficulty consisted in procuring machinery. The successful manufacturer was naturally not desirous of competition, and, in the meantime, the machine shop where the first machines had been made for M. Heymann had passed into other hands, the new people knowing nothing about it. At last, after turning their drawing office upside down, some of the detail drawings were fished up; and, with the aid of these, the construction of a machine was begun. Slowly and with much difficulty, the missing parts were bit by bit added, and the first machine was satisfactorily got to work. This proved a fortune for the machine shop. Orders for these machines flowed in, the factory was enlarged, but still could not keep pace with the demand; other shops sprang up for making them, and also got full of work. It is now estimated that there are about five thousand machines of the kind in actual work for the St. Gall market, making nothing but "*bandes*" and "*entredeux*," while many hundreds more of such machines are erected every year. On an average each machine works three hundred or more needles, which will give an idea of the power of production. This branch of manufacture has, in fact, now grown up into one of the main staples of St. Gall. Chainstitch embroidery, estimated to be five or six times as important, is still almost exclusively made by hand; and manufacturers are eagerly waiting for a machine as good as that for long stitch. The brilliant prospect has tempted many inventors; some have succeeded in making little machines with one needle, but this is not a commercial machine.—*The Engineer*.

VEGETABLE CARBOLIC ACID.—We read that a plant called the *Andromeda Leschenaultil*, growing in the Neilgherry hills, in India, has been found to yield carbolic acid. Mr. Broughton, the Government medical officer for the district, reports that it is far superior in purity to the ordinary product of coal tar, being less deliquescent and free from any admixture of noxious concomitants. As its cost is far above that of the mineral product, and as the latter can be chemically purified, the discovery has no economical or commercial value; but it is interesting as a botanical and chemical fact.

THE M. & T. Sault Company of New Haven, Conn., have had their corporate name changed to that of the Yale Iron Works, and are about to enlarge their works.

Improved Friction Clutch Pulley.

Our engraving illustrates another new claimant for public favor in the line of friction clutch pulleys. The working model, which we have seen, operates very smoothly and powerfully, without noise or jar, and the device presents a very neat compact appearance.

The following is a description of its parts and operation. A and B represent pulleys attached to a shaft, so that by the movement of the collar, C, one may be clutched while the other may be unclutched. The collar is shown in detail at the bottom of the engraving, though, as there shown, it is adapted to the clutching of a single pulley. When used for two pulleys, it has two wedge-shaped projections formed thereon, placed on opposite sides. The collar has a groove turned out in the middle, in the usual manner, for the shifting lever.

The pulley is shown in detail at L. It has a projecting rim, I, so that an annular space is inclosed between this rim and the exterior or belt rim. This pulley turns loose on the haft, except when clutched.

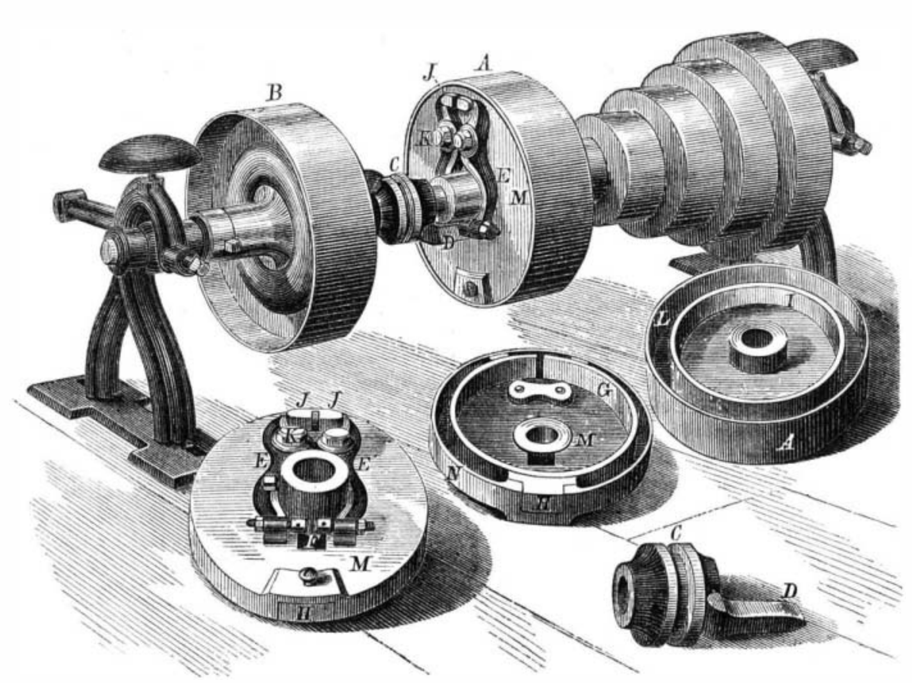
The clutching device consists of a plate or disk, shown in detail at M. It is cast with a rim, N. To this plate is attached a ring, cut apart opposite the point of attachment at H, as shown, the ends formed by cutting the ring, having projections, J, formed upon them, which pass through a curved slot in the plate, M.

On the outside of the plate, M, are pivoted, at K, two bent levers, E. At the ends of these, furthest from the pivots, are two adjusting screws, F, between the heads of which the wedge-shaped projection, D, on the collar, C, enters when the latter is actuated by the shifting lever, causing the pivoted levers, E, to compress together the projecting ends, J, of the ring, G. The plate, M, with these attachments, is keyed or held by set screws to the shaft in such a way that the ring, G, surrounds the projecting rim, I, on the pulley, L.

The collar, C, is feathered on the shaft so that it always maintains its relative position with the plate or disk, M, and at any point of its revolution a proper movement of the shifting lever will force the wedge-shaped projection, D, between the heads of the screws, F, causing the levers, E, to compress together the projections, J, on the slotted ring, G, and, drawing the latter firmly down upon the projecting rim, I, clutch the pulley.

When the pulley is to be unclutched the shifting lever is reversed; the projections, J, then being relieved from pressure, the ring, G, expands by its own elasticity, and releases I.

Patented. Nov. 1, 1870, by Edwin F. Allen, of Providence, R. I. For further particulars address the Star Tool Co., Providence, R. I.



ALLEN'S FRICTION CLUTCH PULLEY

Electro-magnetic Motor for Sewing Machines.

The following is a description of an electro-magnetic motor, as applied to a sewing machine, taken from the specification of Messrs. Stevens and Hendy, of San Francisco, Cal., to whom letters patent were granted last July. The inventors claim that although they illustrate the invention as applied to a sewing machine, it is really capable of being employed in working various other machines. It consists in a novel arrangement of the apparatus which forms the motor, and which, according to the inventors, enables greatly increased results to be obtained from the coils with the same pulley power. It will be seen that the armatures drive the needle bar directly, without the intervention of levers or o her mechanism; while the feed movement is also very simply arranged, and is likewise driven directly from the armatures.

Fig. 1 is a side view of the essential portions of the apparatus; and Fig. 2 is a vertical transverse section of one pair of coils, and also shows the feed motion. The following description applies to the two figures.

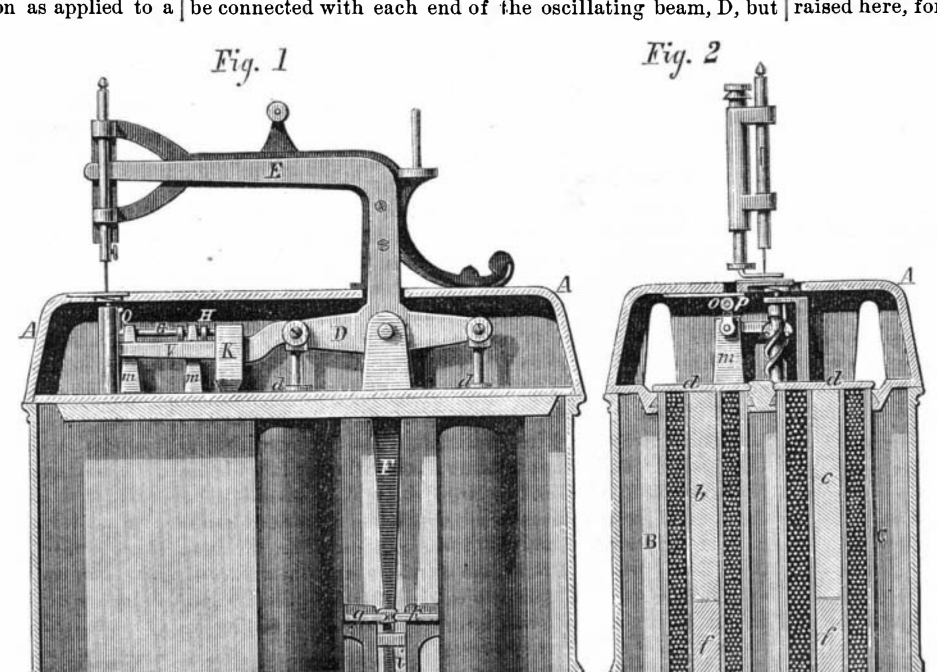
A is a case which rests upon the top of a cabinet, and serves to conceal portions of the machinery; it also serves as a table for the work; two pairs of coils, B and C, are placed so that their upper ends stand just within or at the bottom of the case, A, to which they are secured; these coils are placed at such a distance apart as to admit of the working of an oscillating beam, D, which is supported on standards over their central line; this beam is balanced so that the magnets or armatures of one pair of coils are connected to one end, and those of the other pair to the opposite end.

The coils are constructed as shown in Fig. 2, being formed of insulated wire, coiled to a suitable size, leaving an open ing through the center sufficiently large to admit the magnets and their armatures. The coil is surrounded by an iron cylinder, which greatly increases the power of any given coil. Outside this cylinder another coil may be placed, and this, in turn, enclosed by another iron cylinder; this gives good results, but not so great, in proportion, as are obtained from a single coil and cylinder, which the inventors consider sufficient. The magnets, *b* and *c*, are made, as usual, of soft iron, and each pair of bars united by a plate, *d*, across the top; or they may be formed in one piece, as a U magnet reversed.

The magnets extend down into the coils about two thirds of the depth of the latter, and the armatures, *f*, arise from the bottom, about one third of the hight of the coil, this construction also adding greatly to their power. The oscillating beam, D, has one end connected to each of the plates, *d*, and from some convenient point on its length the needle bar, E, arises and extends forward to the table of the sewing machine, over which the work passes. From the center of the beam, D, an arm, F, depends, and as the beam oscillates from the alternate attraction of the magnets, at either end, this bar vibrates from side to side, striking alternately pins on a vibrating bar, *i*, which is pivoted at the bottom, and which is also caused to move from side to side. This alternately forms and breaks contact with the two pole changers, *g* and *h*, and causes the pairs of coils, B and C, to act alternately, thus moving the magnets, *b*, *c*, the beam, D, and the needle bar, E.

The feed motion is operated in the following manner: A bar or arm, V, extends forward from the end of the beam, D, and partakes of its oscillations. Two standards, *m*, *m*, support a shaft, G, which lies parallel with and a short distance from the arm, V. At one end of the shaft is an arm, H, which projects over the arm, V, and as this oscillates it moves the arm, H, up and down, thus partially rotating the shaft, G, back and forth at each oscillation. A small crank arm, *o*, is fixed to the opposite end of the shaft, G, and the upper end of this is so attached or connected to the feed plate, *p*, as to move it forward and back, raising it at the proper time.

If found more desirable, two or more pairs of coils could be connected with each end of the oscillating beam, D, but the inventors have found one pair sufficient for all ordinary purposes.



ELECTRO-MAGNETIC MOTOR FOR SEWING MACHINES.

In order to prevent noise, and diminish the force with which the magnets and armatures would meet, the arms, V, pass through a case, K, within which are placed elastic cushions, above and below, and against which the bar strikes as it moves.

The inventors also patent a form of "switch," by means of which they are enabled to control the battery power, employing either two, four, or any number of cells required. They do not, however, give any information as to the cost of operating the machine by this means.

IMPROVEMENT IN EXTRACTING SPIRITS OF TURPENTINE FROM PINE WOOD.

An invention patented by James D. Stanley, Washington N.C., consists in attaching to the retort, or still, two purifiers, each containing lime, or other substances, through which the spirits of turpentine, oil, tar, etc., are passed in the formof vapor, and after purification carried to condensers, and fixed in cisterns.

Wire gauze supports are stretched across the first purifier, to sustain or separate purifying substance or substances. The second purifier has, at one end, a perforated sheet of iron, with wire gauze stretched across it, to retain in place the purifying substance.

The condensers are of copper, or other suitable material, and of the form of a hollow cylindrical ring. They are fixed in cisterns, and kept full of cold water.

The retort having been filled or charged with pine wood, and water introduced to the depth of top of grate bars in the furnace, heat is applied, underneath the retort, the draft passing through flues, over the retort, and off through the smoke stack; or the heat may be applied by the introduction of superheated steam into the retort. The white spirits of turpentine now pass off in vapor through a valve into the first purifier, into the first condenser, and are thence drawn off purified and free from tarry odor.

As soon as the spirits begin to show color, the valve is closed, a cock opened, and the water in bottom of the retort drawn off. The remaining colored spirits, oil, tar, and gas, pass off through the second purifier into a second condenser.

The pyroligneous and acetic acids retained in the purifying substances can, it is claimed, be distilled or separated from them with less trouble and expense than by the ordinary method.

The principal advantage of this method is, however, that by closing the valve, as soon as the spirits passing through it begin to show color, the first purifier and contents, as well as the first condenser, are kept clean, so that white spirits can be run through them from subsequent charges; whereas, if colored spirits were suffered to pass through them once, they would have to be carefully cleaned (a very difficult matter) before they could run white spirits again, and colored spirits have to be redistilled several times to render them white, or nearly so.

Thus the inventor accomplishes by one process what has heretofore required several.

Jute in the United States.

A correspondent of the Agricultural Department at Washington speaks of the raising of jute for textile purposes, in the Southern States, as follows:

"I deem it almost as great an acquisition to the country as cotton itself. It yields one of the cheapest fibers which nature produces. It is raised in India, and, I presume, can be raised here, for less than one half the cost of hemp, and for one fourth the cost of cotton. It has been produced in India for one cent per pound of fiber. It is woven not only into gunny cloth and gunny bags, but enters largely into carpets and many kinds of tissues. In India, jute has been constantly gaining upon cotton. England has imported from India, of this article, more than 120,000,000 pounds in a single year; and we, last year, imported more than 19,000,000, which cost more than $3,000,000, and sold at the South for $5,000,000. It is used there, chiefly, to envelop cotton.

"If we had diverted that amount of labor from cotton to jute, we might have raised a much larger quantity at home, and at the same time have increased the value of our cotton crop.

"The jute seems to me to be a plant admirably adapted to the wants of the South. She requires it for bale cloth, also to divert labor from cotton, and to employ the operatives during inclement seasons in the manufacture of cloth.

"I presume that the mechanism used in Kentucky for spinning and weaving hemp, will be appropriate for jute."

These suggestions we regard as worthy the serious attention of Southern agriculturists. The uses of jute are annually increasing, and there is little danger of a glut of this valuable material.

DISINFECTANTS TO ARREST THE PROGRESS OF ZYMOTIC DISEASE.—We must strike off at once a whole class of valuable agents which will not meet the requirement of the case. The infectious matter is a vapor of fine dust, and it is hopeless to attempt to combat the virus by non-volatile disinfectants, such as charcoal, chloride of zinc, etc. What is wanted for general purposes is a liquid volatile disinfectant, such as carbolic acid, which, after acting on infected surfaces, will pervade the atmosphere, and destroy the floating virus.—*W. Crooks, F.R.S.*