

MECHANICAL INVENTIONS.

Mr. Karl Müller, of Fordham, N. Y., has patented an improvement in turning implements for use with lathes in turning articles with straight or tapered surfaces, and consists in certain novel features of construction, whereby the tool is especially adapted for small work, and for obtaining uniformity to a given pattern when the articles are produced in large quantities.

Messrs. Samuel Rather and Daniel Rather, Jr., of Holly Springs, Miss., have patented an improvement in smoke and cinder conductors for railroad trains. This is an improved device for attachment to the cars of railroad trains to receive the smoke and cinders from the locomotive and conduct them to the rear of the trains, to prevent the passengers being annoyed by the entrance of the smoke and cinders into the cars.

Mr. Charles H. Brazeal, of Tye River Depot, Va., has patented an improvement in smut machines which is intended to remove the closely adhering smut as well as that which lies loose among the kernels.

An improved safety hook has been patented by Mr. Henry Blakeman, of Jefferson City, Montana Territory. The object of this invention is to prevent the bucket or other object suspended from the hook from slipping therefrom. It consists in providing the hook with a keeper sliding on the shank to and from the point thereof, and a spring for locking it in place against the end of the hook.

Messrs. Vestus P. Willcox and Orrin Ranney, of Corry, Pa., have patented an improved machine for boring brush blocks and other work in wood or metal requiring straight and inclined holes to be bored close together or in groups.

An improved hay and cotton press, patented by Mr. Jacob Huffaker, of Gap Creek, Tenn., consists of an upright standard rigidly fixed in a suitable base frame, and carrying the follower secured upon its top, while inclosing the follower is a movable press box, that is elevated by shores whose lower ends are provided with rollers, and drawn down or depressed by ropes and rollers and winches; and it further consists in so connecting the rollers and winches and compounding their forces that the operative power may be most advantageously applied.

Mr. Joshua Henshaw, of St. Hyacinthe, Quebec, Canada, has invented an improved machine for extracting stumps and raising stumps, stones, and other heavy objects. The invention consists in the combination of a slotted ratcheted bar arranged to slide on a bar which supports a lever carrying two pawls, which work in the ratcheted bar. Two fixed pawls are provided for retaining the ratcheted bar.

Mr. Royal R. Piper, of East Saginaw, Mich., has patented an improvement in that class of pipe wrenches in which a chain is employed in connection with a serrated jaw and a handle or lever.

Mr. Francis H. Young, of Stanhope, N. J., has patented an improved station indicator for railroads. This invention, although quite simple, cannot be described without engravings.

An improved lifting-jack, patented by Messrs. Joseph S. Blackburn and Samuel G. Brosius, of Beloit, O., consists of a lifting bar having on its lower end a socket piece, which is passed over the standard, while at the upper end of the standard is a pivoted strap, through which the bar is passed.

Mr. Andrew Dilts, of Dallas, Iowa, has patented an improved spoke setting machine. It consists of a frame for holding the hub firmly on a pivot, so that it can be turned freely, and an adjustable gauge for holding the spoke while being driven.

Mr. Joshua W. Jones, of Harrisburg, Pa., has patented an improved evening-up table provided with a device for smashing the head and back folds of the sheets to take out the swell, so that the sheets may lie more solid and compact, thus greatly facilitating the handling of the work in book binding.

Mr. John D. Graves, of Wichita, Kan., has invented an improved windmill, in which the wheel is held to the wind by a vane, and turned more or less at an angle to the direction of the wind by horizontal adjustment of the vane, which adjustment is automatically performed for regulating the speed and power of the wheel by the endwise movement of the wheel shaft acting upon an elbow lever connected to another elbow lever, which in turn is connected to the vane; or it may be done by hand by a rope attached to the first named elbow lever and passed over a pulley.

Mr. Isham M. Rosier, of Jonesville, Va., has patented an improved reciprocating sawmill, which is so constructed as to saw the logs from end to end, reverse the motion of the carriage automatically at the proper time, and saw the log in both directions, thus saving lumber, time, and labor.

SHEARING AND RIVETING MACHINERY.

The engravings on this page represent two machines made by Messrs. Sellers & Co., of Philadelphia, Pa.

A heavy plate shearing machine for trimming the edges of long plates, or for cutting plates of 5 feet in width or under to length, is shown in Fig. 1. This machine was designed to meet the requirements of modern ship building or bridge construction. It is provided with a bed for holding the plate, and clamping it if necessary, and will shear plates 1 inch thick with exceeding exactness. The upper blade is guided vertically, and is driven downward by a pitman as wide as the blade is long, receiving its motion from a long

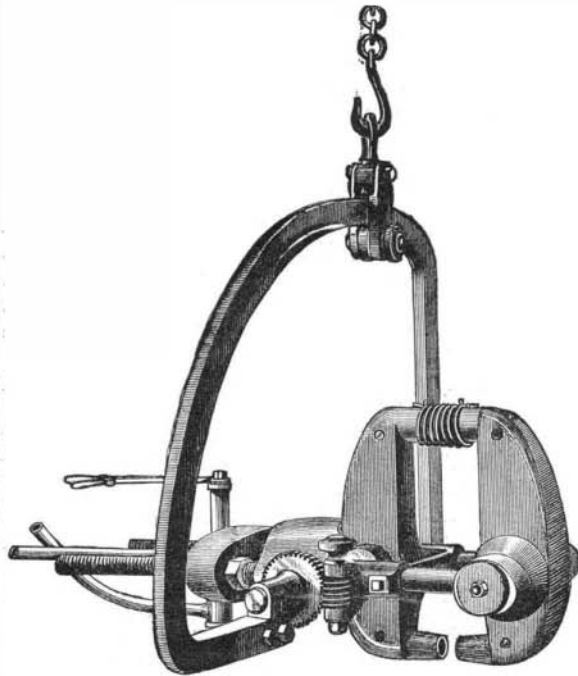


FIG. 1.—PORTABLE RIVETING MACHINE.

rocking shaft above it, which is operated by an arm or lever in the rear of the machine and not seen in the engraving. This arm has a segmental rack working into the teeth of a spiral pinion driven by a bevel wheel and pinion, and open and crossed belt similar to the method adopted by this firm for their planing machines. The driving arrangement is exceedingly efficient, and an automatic adjustment is provided to the belt-shift motion gauging the length of stroke. The blade after making the down stroke immediately ascends again at double its descending speed, and stops up ready for the next cut. It is at all times under the control of the operator, and can be made to cut to any fixed point in its length, and then stopped or raised, the hand rod in front, operated from either side, being used for shifting the belts and starting or stopping. Curved blades can be placed in the vertical slide if desired, and the bed plate connected with the

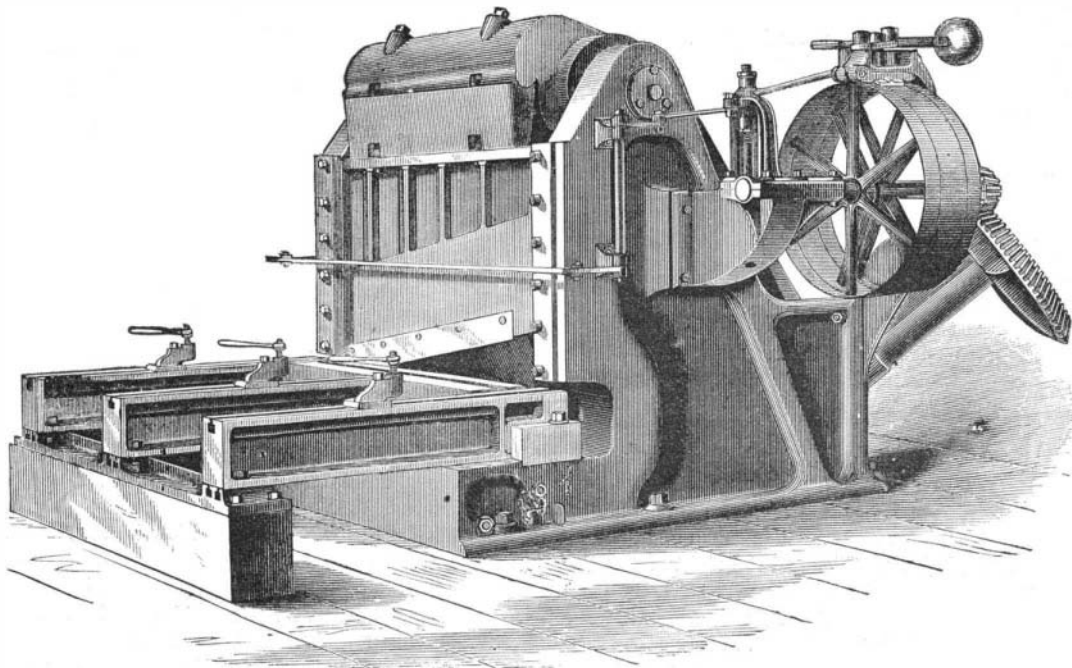


FIG. 1.—PLATE SHEARING MACHINE.

lower blade may readily be removed to receive a curved bed plate, with shear plate bent to correspond with the curve of the upper blade.

The subject of riveting by power has for some time attracted the attention of mechanical engineers, and steam riveting machines have been used with considerable success. There are objections, however, to the use of steam which have been most effectually met by the application of hydraulic power.

Fig. 2 shows a portable riveting machine possessing many new features, and arranged with convenient overhead carriage and hoisting machinery to facilitate its use. The essential point of this invention consists in the use of an accumulator, from which a continuous regular pressure may be ob-

tained as wanted. The adjustable accumulator is arranged with weights suspended below the main casting, and easily released, if required, to adjust the pressure to the kind of work being done, each weight representing 250 pounds per square inch on the ram of the riveting machine, and the maximum pressure obtainable being 2,000 pounds per square inch. A double acting pump is connected with it, operated by crank motion, and taking its water from a reservoir in the upright column to which it is attached. The pump is arranged so that when once started for work it is never stopped while the machine is in use. By an improved relief valve, as soon as the accumulator is full, the direction of the water coming into it from the pump is changed back into the same reservoir from which it was taken, and it continues so to flow until wanted in the accumulator, when the action of the valve directs it back again. The pump is maintained in motion ready for immediate action, and yet relieved from strain when not required for work, avoiding all risk of delay at starting or of loss of water and entrance of air in the chamber while standing.

The portable riveter is suspended from a hoisting machine and overhead carriage, having both longitudinal and transverse motion. The water under pressure is carried by jointed or flexible pipes from the accumulator to the machine, and passes into a compressing cylinder in which a piston works.

The Hotchkiss Magazine Gun.

The Hotchkiss magazine gun, which is now made in part at the armory, is a modification of the French chassepot. The magazine, which is in the butt, contains six cartridges, which are forced forward by a string. The barrels, ramrods, bands, stocks, and some other parts are made here. The patented parts are made by the Winchester Repeating Arms Company, of New Haven, who have expended about \$30,000 in preparations for their manufacture. The machinery at the armory is not adapted to the manufacture of these parts; and, as the appropriation of Congress is only \$20,000, and the whole thing is an experiment, the plan of obtaining the small parts from the Winchester company serves the interests of economy, and will result in the production of eleven hundred guns, while otherwise only five or six hundred could be made. When completed these guns will be distributed to the army for practical tests.—*Springfield Union.*

Photography of Flashing Signals.

Army telegraphing by means of flashing signals has been successfully done, between stations fifty miles apart, by the British in Africa. The London *Photographic News* suggests that a camera be employed to photograph the signals by the heliograph, as it would be possible to signal much faster, for the receiver, instead of requiring time to puzzle over the message as it was transmitted, need pay no attention until the complete sentence was before him. No doubt there would be certain practical difficulties to be overcome in adapting the camera to the heliograph, but applications of a like nature are practiced every day by scientific men. The Mance heliograph, first submitted to the British Government by Mr. Mance in 1869, as now used, is a very simple contrivance, and as photographers are interested in all that pertains to light, they might like to know how the apparatus is worked. It consists simply of a tripod, upon which stands a mirror. This mirror is usually ten or twelve inches in diameter, and a glass of this size is capable of reflecting a ray visible to the naked eye at a distance of fifty miles, and even more in clear weather. The mirror is movable, swinging like an ordinary toilet looking-glass, but it has, moreover, a pivot at top and bottom that permits it also to be turned sideways. In this way it is possible, whenever the sun shines, to reflect a ray in any direction, unless it should happen that the sun is too far behind, when the difficulty is at once obviated by bringing into play a second mirror, which reflects the

rays on to the first. But if the distance to be signaled is fifty miles off, it is necessary that the signaler should aim perfectly straight, and to do this he handles his mirror after the manner of a rifle. He gets behind it, and looks through a hole in the center (where the quicksilver has been removed), and having sighted the station afar off, he brings up in a line with his eye and the station a small stud that slides on a sighting rod, some ten yards in front of the mirror. When this stud covers the distant station, the aim of the mirror is correct, and all the signaler has to do is to see that the reflection of his mirror shines upon the stud. So long as this is the case he may be sure his brother afar off will see the reflection too. A key to be pressed by the hand is in connection with the mirror, and throws the reflection on

and off the stud, and by pressing this key for short or long intervals, short or long flashes are produced. This is the whole story of the heliograph; and now, says our contemporary, that our readers may have learned its *modus operandi*, we hope some of them will set to work and apply a camera to it in such a way that the flashes may be recorded and true light impressions produced by its means.

AGRICULTURAL INVENTIONS.

Mr. Joseph W. Hobson, of New York City, has patented an improved horse hay rake, in which, by the adjustment of the rake teeth points forward and backward, together with the integral vertical adjustment, a great number of positions for the rake can be obtained to suit the requirements of the land or crop, or the views of the operator.

Messrs. Samuel Scott and Winfield Scott, of Floyd Court House, Va., have patented an improvement in the class of devices attached to trunks of trees for the purpose of protecting them from injury by worms, borers, and other insects or animals. The device is made of sheet metal in conical form, and is adapted for adjustment in diameter or size.

Messrs. Mortimer B. Mills and Christopher E. Dinehart, of Chicago, Ill., have patented an improved apparatus for generating steam for cooking food for cattle. It has a large area of heating surface within a small cubical space, and is adapted to economize heat to a high degree.

Mr. John W. Blackhart, of Wells' Tannery, Pa., has patented a fork for hay and like material, furnished with a weighing apparatus, by means of which each fork load can be weighed as it is handled.

Mr. John T. Greenfield, of Uniontown, Ky., has invented a plow, the cutting parts and gauge wheel of which can be conveniently lowered or raised, as may be necessary, on account of hardness or unevenness of the ground, by a person seated on the plow, and also to provide a plow, the cutting parts of which can be easily sharpened.

An improvement in plows has been patented by Mr. John M. Martin, Jr., of Ocala, Fla. The invention consists in the arrangement of a plowshare provided with a detachable mould board or wing, for the purpose of throwing more ground over the grass in the middle of the rows.

Photography in Natural Colors.—Printing Photocolographs.

After referring to the fallacy of producing natural colors by the camera, as put forth by Rev. L. L. Hill, of this State, whose alleged discoveries were published in this paper as long ago as 1850, a writer in *Chambers' Journal* says:

"It would be a triumph of optics and chemistry if photographs could be made to represent the natural colors of objects. Attempts toward this result have hitherto ended for the most part in disappointment. But Captain Abney, in a short paper 'On the Production of Colored Spectra by Light,' read before the Royal Society, makes known that he has succeeded in producing, approximately in the natural colors, pictures of the solar spectrum on silver plates, and also, but less brilliant, on compounds of silver held in place by colloid. 'I reserve for the present,' the Captain writes, 'the exact details of the production of these pictures, but may say that they are produced by oxidation of silver compounds when placed in the spectrum, an exposure of two minutes being amply sufficient with a wide slit to impress the colors. The coloring matter seems to be due to a mixture of two different sizes of molecules of the same chemical composition, one of which absorbs at the blue end, and the other at the red end of the spectrum, and the sizes of these molecules are unalterable while exposed to the same wave lengths as those by which they were produced.' And he is of opinion that 'the colors may be preserved unchanged when exposed to ordinary daylight.' From this it will be understood that Captain Abney has made a step in advance of high importance."

To this the *London Photographic News* adds: We should be very sorry indeed to appear to underrate the work of Captain Abney in this direction; but, unless our memory misleads us, M. Becquerel obtained an image of the solar spectrum in natural colors early in 1849. Niepce Victor and others have since secured still greater results. On a film of sub-chloride we ourselves have obtained very approximate natural colors. But in all these cases the colors were evanescent. Captain Abney is of opinion that his colors will remain unchanged when exposed to ordinary daylight. This is a decided step in advance. Our own results were gradually destroyed by daylight. We shall look for further details of our friend Captain Abney's operations with interest.

The writer in *Chambers'* proceeds to refer to the interesting experiments of Herr Albert in printing colored photocolographs, which have, however, no connection with photography in natural colors. He says:

"In connection with this we mention improvements in color printing by which Herr Albert, court photographer at Munich, produces chromo-photographs of surprising excellence. The process commences by the taking of three photographs, each being exposed to the action of different and definite portions of the spectrum. This is effected by causing the light, before it reaches the sensitized plate, to pass through colored glasses, or suitable colored liquids, and, moreover, by employing in each case special solutions for the development of each negative. A positive printing plate (a glass plate gelatinized) is then produced for each negative; and, if the absorbing media and the developing preparations have been correctly chosen, it is only necessary to color one

of these plates with red, another with yellow, and the third with blue, in order, by successive printings, to obtain a picture which exhibits more or less resemblance to the original. Success appears to depend on the skill and nicety with which the absorbing materials are employed, for mixtures of colors and of coloring materials are quite different things; and, to quote the technical description, 'for the negative belonging to the blue plate we must employ such absorbing media and preparations as will prevent green from producing any influence on it, and at the same time will render blue and violet quite inactive, inasmuch as these tints must appear only on the positive plate.'

"Specimens of landscapes and of decorative panels printed by Herr Albert's process were exhibited at scientific receptions in London during the past session, and were deservedly admired. The details were shown: a plain yellow picture; then on the yellow a blue, and on the blue a red; and with these three the effect of a well-finished water color drawing was produced."

Launch of the Agamemnon.

The Agamemnon, four, double screw iron armor-plated turret ship, 8,492 tons, 6,000 horse power, was launched at Chatham on September 17. She has a length of 280 feet, compared with 325 feet for the Inflexible, and a breadth of 66 feet compared with 75 feet, while the displacement in tons of the Inflexible is 3,500 greater than that of the Agamemnon. Her two revolving turrets, which will be plated with iron $1\frac{1}{2}$ inch thick, will be placed *en échelon*, and will contain each two 38-ton guns, all four being revolving. Her power of attack, however, is not confined to ordnance, for she will be armed with Whitehead torpedoes, means of ejection being provided from the armored sides of her citadel. Her water-tight compartments are to be filled with cork, the object being to prevent her from sinking if struck below the water line. She is an ironclad of the center citadel type, which means that she is built with an invulnerable citadel, or central compartment, which is kept afloat by two unprotected ends of the vessel. Within the walls of this citadel are inclosed the magazine, engines, boilers, and ordnance, with its hydraulic loading gear. The armor protecting this citadel is 18 inches thick, and that on the turrets 16 inches; on the citadel is two thicknesses. The outer or face armor will probably be of steel, strengthened by vertical angle iron girders 11 inches wide and 3 feet apart, the space being filled with teak. Behind this backing and these girders will be riveted the rest of the armor, which will, in its turn, be backed by horizontal girders and another thickness of teak. In addition to the ordinary decks there is a superstructure, running lengthways with the keel and erected above the upper deck, for working the vessel. In the "unprotected" portion of the vessel horizontal armor is largely used. This is no less than 3 inches thick on the upper deck, and on the lower deck, both before and in the rear of the citadel, 6 feet under water, the same thickness of plating is used. The Agamemnon is calculated to realize a speed of 13 knots an hour.

How they Attract Custom to the American Produce Stores in England.

Within the last few months, consequent on the large importations of American produce into Bristol by the Great Western line of steamers, a great many stores for the sale of American provisions have been started in different parts of the city, especially at Laurence Hill and Russell Town, in the eastern portion, and in Bedminster, the district of Bristol in Somersetshire. The go-ahead character of these stores is manifested in many ways, and one store at East street, Bedminster, has lately been rendered notorious by a large flag suspended from a pole above the shop. Other grocers and provision merchants in the neighborhood made a display of bunting likewise; and the police, not partial to this flourish of finery, brought the matter before the magistrates, who on Tuesday were called to adjudicate in a summons taken out against Mr. Frederick Wm. Leach, proprietor of the American Stores. He was charged under the 18th Section of the Bristol Street Encroachment Act with projecting from one of the windows of his premises a pole and flag to the inconvenience and danger of the public. Mr. Clifton, who appeared for the defendant, admitted that the defendant had exhibited a flag from his premises, and contested the right of the police to interfere. Police Sergeant Smith said that, in consequence of instructions received from his superintendent, he called on the defendant on the 30th ult. in reference to the flag, and defendant asserted that he had a perfect right to exhibit it, and declined to take it in. The chief constable (Mr. E. Coathupe) said that, on August 18, he was driving through Bedminster, and his horse caught sight of a string of flags suspended across the carriage-way, and started off, and it was with the utmost difficulty he could control the animal. Witness, understanding that several of the flags were only exhibited as trade advertisements, communicated with the town clerk, and, being advised that the practice was illegal—in fact, an encroachment on the public rights—communicated with the divisional superintendent. Mr. Clifton, interposing, said he understood on that day there was a parochial garden party at Bedminster, and that the string of flags did not belong to his client at all, but were thrown across the road in honor of the event. Superintendent Harris deposed that in the second week in August the flag shown from the defendant's premises was lower than it was now. The defendant kept an American store, and one or two provision dealers also

hung out flags in opposition, until one hoisted a string of eleven. He called on them, and, having complained, all of them discontinued exhibiting their flags with the exception of the defendant, who said he should contest the question whether or not he had a perfect right to do what he was doing. Mr. Herbert Thomas, magistrate, said the Bench were of opinion that no obstruction or nuisance had been proved, and they therefore dismissed the summons. A summons against another tradesman was, after this decision, withdrawn by the police. As several shopkeepers in Bristol, desirous of hanging their banners on the outer walls of their premises, have been awaiting the issue of this test case at Bedminster, the streets of Bristol will no doubt ere long assume a gala appearance, and the flags about shops will rival in number the "flags" of the pavements.—*London Grocer*.

Division of Electric Light.

Referring to the division of the electric light, the *Mining and Scientific Press* says:

"We give the result of experiments, of which we were an eye-witness, at the *atelier* of Messrs. Molera & Cebrian, in this city. The light used by them was a 4,000-candle electric light, inclosed in a chamber, on one side of which was a 24-inch Fresnel lens, from which the light is projected in parallel lines. The whole or any number of these lines or rays of light may be collected on a mirror or reflecting surface of any kind, and distributed in any greater or less intensity through secondary lenses without additional loss. In the experiment hardly one-half of the main light was collected, but it was divided into 16 separate lights, equal to 80 candles each. The secondary lenses were of small size, and situated in the ceiling, the light being thrown down. The quality of the light was equal to pure diffused daylight—in fact, several hundred shades of silk, arranged upon cards and placed side by side, could be distinguished as readily as by sunlight. Had it not been for the loss of light, occasioned by the size of the reflecting mirrors, we believe the light could have been subdivided to its fullest extent and into at least 50 separate lights. The whole light from the main lamp can be divided and subdivided, and distributed down to a single ray even, at pleasure. The dispersing lenses and reflectors are arranged inside the building so as to illuminate every part without any obscure corners. In the open air the rays of light thrown upon objects over a mile away in the darkness of night brought them into view with startling distinctness."

This system of electric lighting was recently illustrated and fully described in the columns of the *SCIENTIFIC AMERICAN*.

St. Paul (Minn.) as a Milling Center.

The *Pioneer Press*, of St. Paul, Minn., states that there are now building at the Falls of St. Anthony, five large flouring mills, of which one will probably make from 2,500 to 3,000 barrels a day, another 2,000, another 1,000 to 1,200, and the others from 500 to 800. In addition to this, Gov. Washburn is tearing out the inside of his old "B" mill in order to put in improved machinery, so that when completed it will have a capacity of from 1,500 to 2,000 barrels. It is worthy of note, in this connection, that it is but a little while since a 300 barrel mill was considered a large one, and 500 barrel mills were rare.

The *Press* estimates that when all the new mills are finished and running on full time, the daily production of flour in St. Paul will be over 12,000 barrels, which, with the mill-stuff made, will load seven trains of twenty-one cars each. At this rate the yearly production will be over 3,000,000 barrels, requiring 15,000,000 bushels of grain.

Nitrate of Silver Stains on Clothing.

To the Editor of the *Scientific American*:

In your issue of October 11 is a paper on the removal of silver stains from clothing. The salt recommended to be used is stated as bichromate of mercury. This is an error; it should be *bichloride* of mercury, known commonly by the name of corrosive sublimate.

Its solubility is greatly increased by first dissolving a little chloride of ammonium in the water.

GEORGE WILSON.

New Haven, Conn.

Pine Cones for Fire Kindling.

Almost the universal article used on the Continent for kindling fires are dry pine cones. A couple of these is usually enough to start a fire of dry wood, and several of them contain enough resinous material to start a coal fire without other kindling. They are readily ignited with a match, and are free from dust and insects. In Paris, and other large cities on the Continent, scarcely any other than pine cones are used for kindling purposes in the hotels, and it is a wonder to us that they have not been introduced for the same purpose here. We believe a large and profitable business might be made from gathering the cones in pine growing regions and selling them in our cities.

The Purification of Memphis.

A very earnest effort has been made by the National Board of Health to thoroughly disinfect Memphis. In this important work there had been used, by the end of September, upward of 170,000 pounds of copperas, 9,000 barrels of lime, 40 barrels of sulphur, 15 barrels of carbolic acid, 1,215 pounds of sulphate of zinc, and 1,200 gallons of zinc iron.