varied by the pushing or pulling of the stock or handle.

[The above invention consists in the application within the tool stock or handle, of such an arrangement of ratchet or rag-wheel gearing, as will enable the tool or instrument to be rotated in either direction at the pleasure of the operator, by turning the stock or handle back and forth, in opposite directions, and at the same time pushing it from or pulling it towards him. By pushing the handle from him the tool or instrument may be rotated in one direction, and by pulling it towards him may be rotated in the opposite direction. It forms a highly useful and convenient instrument.]

Arrangement of the Thills of Vehicles—Noah Warlick, of Lafayette, Ala.: I claim the swinging frame composed of bars a, and b, and braces c, adapted to the reception of either thills or pole, substantially as and for the purposes specified.

Railroad Car Coupling—John C. Ward, of Charleson, S. C.: I make no claim to a tumbler where a partial rotation effects the coupling, when such rotation is produced by hand; neither do I claim the fastening produced by the rotation of either socket or link, and known as the "bayonet joint" fastening.

But I claim the weighted arm A, stud H, and slide-catch B, in combination with the partially rotating tumbler, when said tumbler constitutes the securing socket, constructed, arranged and operating substantially as described, for constituting a self-acting car-coupling.

RE-ISSUES.

Artificial Stone—St. Jullien Ravenel, of Charleston, S. C. (Patented Aug. 12, 1856): I claim the composition of marl and slaked lime, substantially in the proportions specified, for producing an artificial stone, or a substitute for stone and bricks.

Self-Sealing Cans—Robert Arthur, of Philadelphia, Pa. (Patented Jan. 2, 1855): I claim, first, a vessel made with a groove to surround its mouth, prepared with cement, and ready for hermetically sealing, but to hermetical sealing itself I make no claim.

Second, I claim the employment of elastic packing, arranged and retained by a groove of an acute form, or whose sides are in close proximity, in the manner and for the purpose described.

Boring Machine—Arcalous Wyckoff, of Elmira, N.Y. (assignee of Wyckoff & Morrison, of same place.)—Patented Sept. 25, 1855: I claim, first, the tubular or hollow auger or bits, D, as constructed, having the cutting lips of the bits approach the center, and yet separated from each other, boring without the use of a screw on the end of the bit, for the purpose of preventing the bit from following the grain of the wood.

Second, I claim the worm .., operating on its own axle, and independent of the revolution of the auger or bits D, for the purpose of clearing away the chips, as set forth.

[This invention is now on exhibition at the great Fair of the American Institute, Crystal Palace, N. Y. We shall shortly illustrate it by an engraving from a working machine.]

DESIGNS.

Stoves—Hudson E. Bridge, of St. Louis, Mo.

Electro-Plating with Aluminum.

[Concluded from page 31.]

No. 7. *To plate with an alloy composed of Aluminum and Nickel.*—We form a bath of alumina according to the solution No. 3, and we attach a pole of nickel, with which we work the bath, supplying the alumina in solution from time to time. A strong battery power may be used for the baths of nickel, but they will work with various powers. Or we add to the bath of alumina a bag of the oxyd of nickel, which we prepare in the following manner :—

We dissolve nickel by nitro-muriatic acid, say one part muriatic and two parts nitric, and precipitate by ferro-cyanide of potassium; we then wash the oxyd, and it is ready to be placed in the bath. If this bath be used with a platinum pole, both the oxyds must be supplied from time to time; if with a nickel pole, the alumina alone must be supplied in solution. Or we take about 4 oz. of nickel, which we dissolve with nitric acid, and precipitate with carbonate of potassium; we then take the oxyd so produced, with about 4 lbs. of carbonate of ammonia, and 4 gallons of distilled water, to this we add about 1-4 lb. of the oxyd of alumina, prepared according to No. 3, boil in an iron vessel, filter the solution, and then it is ready for the bath, which we work with a nickel pole.

No. 8. *To plate with Aluminum and Copper.*—We dissolve alum in water, and precipitate either by carbonate of potassium or carbonate of ammonia; we then filter the alumina, then take the alumina and roast it upon an iron plate until dry; we then place about 4 lbs. of cyanide of potassium in an iron crucible, and completely melt it; we then add about 1 lb. of the dried alumina, and melt this with the cyanide; we then add (by degrees, so as to avoid too violent an ebullition,) about 1 lb. of carbonate of soda, and we fuse these three ingredients together about one minute, at a red heat; we then take about 1-2 lb. of the sulphurate of copper, which we add to the fused alumina, and again fuse it with copper, until both are melted, then turn it out on a slab; then place the compound in about four gallons of water, boil it, and filter it, and the solution is ready. This solution should produce a deposit of reddish purple, having the red color of copper influenced by the aluminum. This bath may be worked with a platinum or a copper pole. In the former case the bath must be replenished with the oxyds of both metals; in the latter case, with alumina in solution only.

No. 9. *To plate with Aluminum, Copper, and Zinc.*—We take half a pound of the sulphate of zinc, which we fuse with the alloy of alumina and copper, as described in No. 8, introducing the sulphate of zinc next, after the copper has been fused with the alumina, and we then proceed to complete the solution as in the foregoing. We then try the bath, to ascertain if there has been a change in the color from the former red color, produced by the bath of copper and alumina, to a color more resembling gold or brass. If it be not sufficiently changed to a yellow tint, which should be the effect of the sulphate of zinc, we add some oxyd of zinc and a further portion of cyanide of potassium. It is preferred to work this bath with a pole of brass, supplying alumina in solution from time to time; and we have found the same results from various powers of the battery.

No. 10. *To plate with an alloy of Aluminum, Silver, and Tin.*—The bath of alumina is made in the same manner as No. 4, with the exception of using 8 lbs. of cyanide of potassium in lieu of 4 lbs. We then take 8 oz. of metallic tin, dissolve it with nitro-muriatic acid, precipitate with salts of tartar, and dry the oxyd; we then melt the cyanide of potassium in an iron pot. We then fuse the alumina and carbonate of soda, as described in No. 4; then add the oxyds of silver and tin to the hot liquor, let it remain a few minutes, dissolve it in about four gallons of distilled water, boil the solution, filter it, and it is ready for the bath. This solution may be worked with a platinum pole, in which case the oxyds of all the metals must be supplied; or it may be worked with a pole of silver and tin, in which case the alumina alone must be supplied, and a moderate battery power should be employed.

No. 11. *To plate with Aluminum and Iron.*—We use a bath of alumina, prepared as before named; then take sulphate of iron and dissolve it with water, precipitate with salts of tartar, filter it, then take the oxyd of iron, and add to the solution of alumina, in the proportion of about 1 lb. of the oxyd of iron to 4 gallons of the solution of alumina; boil them together, filter, and the solution will be ready for use. This bath may be worked with a platinum pole, and the strength of the bath is sustained by adding the oxyd of aluminum and the oxyd of iron from time to time. If aluminum or the alloys of aluminum with other metals be required in a solid state, it or they may be deposited, as before described, on a metal which melts either at a higher or lower temperature than the aluminum, or the aluminum and its alloys, or upon a metal that is harder than the deposit, and the deposit can then be separated by heat or by scraping, and the aluminum or aluminum and its alloys, so obtained can be consolidated by processes already known.

The Steam Frigate San Jacinto.

Messrs. Editors—In reading the first number of this volume of the Scientific American, we noticed the remarks about the *San Jacinto*, and believing that you have no wish to do us an injustice, we send you the following information:—The present machinery of the *San Jacinto* was completed by us in July, 1854, and up to the present time (propeller excepted) has given entire satisfaction. The first propeller was seriously injured (while at the Navy Yard here, previous to her trip to Europe) by being suddenly stopped, when making thirty-three revolutions per minute, by a large timber floating into the propeller well. As the injury was not visible, the ship sailed, and broke a blade when going to the Baltic. On docking the ship it was found to be the injured blade that was lost, and a previous fracture of considerable magnitude observed. The subsequent breaking of the second and third blades followed as a natural consequence the breaking of the first. The present reports of the breaking of the machinery are all untrue, and are based on the following circumstance:—After steaming to China, they left for Japan; just after leaving port a slight jar was observed in the propeller and on examining it, it was found that the key which held it on was becoming loose. As there was a dock in China where it could be secured and none in Japan, the engineer advised returning to port, and hence the various reports as to her breaking down, etc.

In sending you this information we have no desire to be ourselves known in print, but simply to give the facts of the case.

Merrick & Sons,
By B. H. Bartol.

Philadelphia, Oct. 11th, 1856.

[For the Scientific American.]

Growing the Chinese Sugar Cane.

Messrs. Editors—As the Chinese Sugar Cane is attracting the attention of the community, and as it is likely to be of great value to the farmers of the United States, and as you have given us an article on this subject in No. 1, Vol. XI, of the Scientific American, I thought I would write down and send you the result of my own experience in the growth of this plant.

Some time during the last winter I obtained about three hundred seeds of the "Sorgho Sucre" from the Patent Office, which I planted on the 1st of May last, on land that had been cleared three years ago. I laid the field off in checks three feet apart for corn. In some of these hills I planted the seeds of this sugar cane, dropping eight seeds in a hill, making thirty-seven hills in all. I worked the cane precisely as I did the corn, giving it three plowings and three hoeings. In four months from the time the seed was planted the cane was fully matured. It then measured ten feet six inches high, and one inch and three-eighths in diameter at the butt end. The joints average twelve in number to the cane, measuring from six to eleven inches long, the shortest at the bottom and the longest at the top. As soon as the seed was ripe, another head of seed put up out of the second joint from the top, and in a short time grew as high as the original head, though not quite so large. By the time the seed on this head began to turn dark a third head sprung up from the third joint, which was about the size of the last head, and now a fourth head is making its appearance from the fourth joint. Where this shooting forth of new heads would end, if no frost should come to kill it, I cannot tell. The roots, where I cut off some of the canes some time ago, are sending up new sprouts, some of which are four inches high. I am of the opinion the Sorgha Sucre is a perennial plant, and would grow all the time if there were no severe cold to kill it. It appears to surpass anything we can plant in producing fodder for cattle. There are commonly twelve leaves on a cane, and these measure, on an average, three feet long, and three inches and a half broad. We commonly plant two stalks of corn in a hill. I had eight canes in the same space, each cane producing full as much fodder as one stalk of corn. At this rate, which is to me matter of fact, one acre of cane will produce as much fodder as four acres of corn. But I am persuaded that I might have planted the cane in drills of three feet apart, dropping eight seeds in every space of eighteen inches, and by this means have eight times as much fodder as corn would produce.

One head of seed that I picked up at random measured three gills, and one gill contained eight hundred seeds. I then selected a large head, and measured it, and found it to contain four and a half gills of seed. The 37 hills that I planted produced three pecks of seed, this, after drying it two days in the sun, weighed 32 pounds. I had no mill to squeeze the cane, in order to make experiments in syrup and sugar. I made a little roller, which I thought might press out some of the sap, but it was a failure, for want of sufficient power. It flattened the cane, but did not press out the sap, of which the cane appeared to be full. I twisted a joint in my hands after being flattened with the roller, and obtained about half a gill of sap, which was as sweet as any of the sap of the sugar cane of the south. I intend, Providence permitting, to plant at least half an acre next spring, and procure a proper mill and boilers, and make a thorough experiment.

Jos. McKee.

Juno, Lumpkin Co., Ga., Sep 1856.

[For the Scientific American.]

The Action of the Galvanic Battery.

In S. B. Smith's answer, on page 19, Scientific American, to M. Vergnes, I was surprised to see him attempting to prove his theory of the electric current taking the surface of fluids in preference to descending into them, by stating the well-known fact of the positive pole in solution being more rapidly dissolved at the top than at the bottom, when in reality this action arises from a totally different cause. It is well known to chemists that all metallic solutions, if allowed to stand, become more dense as you descend below the surface, from the fact that the heavier portions of the fluid settle to the bottom until the lowest stratum becomes nearly or quite saturated with the metallic salt, and finally crystalizes on the bottom of the vessel, while the top of the fluid is comparatively free of metal. If a solution of cyanide of silver and potassium be set aside for twenty-four hours, it will be found, upon examination with the proper instrument, to contain 50 per cent. more silver at the bottom than at the upper stratum of fluid. If any person will examine a negative plate in a battery after an action of a few days, he will find the silver deposited two or three times heavier at the lowest extremity than at the upper. Now the reason why the positive pole is more rapidly dissolved at the upper part is this: The solution being nearly saturated with metallic acid at the lower portion, there is little or no free solvent to attack the positive plate at that point, while, on the contrary, at the upper part of the liquid there is a large quantity of free cyanide ready to take up the metal when the action begins. In the process of precipitation, the lower part of the liquid, instead of supplying itself from its own part of the positive plate, is actually being fed from the top, and by a close examination the two currents can be distinctly seen with the naked eye, the one saturated and slowly descending from the positive pole, and the other having deposited its burthen of metal, rapidly rising to the top to again receive its load of precious metal, thus producing a continual circuit, as long as the action goes on. This inequality of density in metallic solutions is more distinctly seen in a sulphate of copper solution than any other. If the positive plate be set flat down at the bottom of the solution, and the negative at the top, and left in action a few hours, it will be found that the top of the liquid is entirely robbed of metal, while the bottom is so completely saturated that large crystals are forming upon the positive pole, and entirely obstructing the electric current—crystalized metallic salts being non-conductors.

James Powell.

Cincinnati, O., Sept. 30, 1856.

[We have also received a letter from Geo. H. Guild, of Lexington, Ky., on this subject, confirming the statements of Mr. Powell. He says:—

"Having had several years' experience in the silver plating business, I believe the plate is decomposed according to its density, and in no case yet, where I used a plate of uniform density, have I found it more decomposed at the top than at any other point of its contact with the solution, Mr. Smith's assertion to the contrary notwithstanding. I have specimens with the center entirely gone, others with the lower corners and edges gone. Mr. Smith scouts the idea of the irradiation of electricity being governed by the same laws as those of light and heat. If there is no irradiation to electricity, how is it that an object subjected to the silver plating process is plated with a uniform coat at the lower extremities, as well as at the surface without regard to the size of the silver plate immersed?"

Stove Polish.

As the period has arrived for the polishing up of stoves for winter use, we have a good word to say in favor of the polish prepared this year by Quarterman & Son, No. 114 John street, this city. Excellent though their former polish has always been, they have made a decided improvement on it this year; it far surpasses anything of the kind we have hitherto tried.

The steamship *City of Savannah*, sprung a leak on the 12th inst., off Cape Hatteras, and soon sunk; officers and crew were all saved.