

head are each held by two screws, by loosening which they can be moved endwise to make the adjustments required for the different cuts on the work. Between the spindle and revolving head, and attached to the bed, is a slide rest, operated by a hand lever, G. It has two tool posts, one at the back, sliding in a groove parallel with the ways of the machine, and one in front, sliding in either one of two grooves, side by side, but at right angles with each other. The bottom of this rest is planed on the ways of the bed, and can be moved upon them to any position required. Two tools are used in these for cutting off, pointing, or grooving. The motions of both these tools are limited by set nuts upon a screw underneath the rest. The lathe bed has short legs and is set upon an iron table having a channel around the edge to catch the oil. The overhead work has two patent friction pulleys to reverse the motion of the arbor. Several sizes of these machines are made—the largest suitable for screws like the breech pin of the Springfield rifled musket, and the smallest for screws $\frac{1}{8}$ to $\frac{1}{4}$ -inch diameter, and for drilling gun cones. On the large machines a hand wheel, with rack and pinion, is used to operate the tool head.

The overhead pulleys, with the hangers in which they run, are represented in a reversed position on the floor beneath the machine.

These machines will be found very useful in any machine shop for making all kinds of set screws and studs at half the usual cost, and of perfectly uniform size. They have been introduced into the U. S. Armory at Springfield, and into many of the private gun manufactories throughout the country.

Gunmakers and others desiring further information can address the manufacturers, J. R. Brown & Sharpe, at Providence, R. I.

TAPPING MACHINE.

All machinists have experienced the tediousness of cutting screw threads in nuts or other parts with a tap worked with an ordinary tap wrench. Various devices have been employed to facilitate this operation, especially when large numbers of holes of small diameter are to be threaded. The tap is sometimes fixed to the spindle of a lathe and motion given to it in either direction by means of a belt pulled by the hand of the workman, or in some cases, where the lathe has a reverse motion, by power. When the piece to be tapped is too large to admit of this method, a tap fixed in a bit stock is tolerably efficient. A machine has occasionally been used in which the tap is severed by means of a treacle. But most of the arrangements in common use are objectionable either on account of being too slow, want of accuracy in the work performed, or the expense occasioned by the frequent breaking of taps.

The machine shown in the annexed cut is intended to obviate these difficulties. In its general appearance it resembles an ordinary lathe, the two pulleys, *a* and *b*, in the head, are, however, independent of each other, one having an axle extending to the right and the other to the left. These axles pass through holes in the ends of the head stock, and are thus supported but left free to revolve. Through the axes of the axles of both pulleys a hole is bored in which an arbor is fitted so as to slide freely, and to one end, *c*, of this arbor a tap is secured. In the middle of the arbor a mortise is made in which is inserted a flat piece of steel about three inches long. This piece stands at right angles with the arbor, projecting an equal distance on both sides, and comes between the two pulleys when the arbor is in place. It acts as a dog by which the arbor is revolved. In the side of each of the two pulleys, between which this dog is placed, are two small studs. These are designed to catch the dog and thereby revolve the arbor, but the distance between the outer ends of these studs in the opposite pulleys is sufficient to leave the dog free from both, so that the arbor may be at rest when both pulleys are revolving. The pulleys are driven in opposite directions, and by pressing the piece to be operated upon against the end of the tap, the arbor is moved endwise, and engaged by means of the dog and clutch screws with one of the revolving pulleys. This gives motion to the tap, causing it to enter the hole in the work and cut the thread. A slight movement of the work in the opposite direction, reverses the tap by moving the arbor endwise sufficiently to disengage the dog and connect it with the other pulley. The foot or tail stock, *d*, carries an

arbor which slides freely, but is prevented from turning by a spline or feather. On one end of this arbor is a stop which can be adjusted to limit the end motion as desired, and on the other end any device required for sustaining the work can be placed. By setting the stop on this arbor the tap will cease to revolve at any desired point, so that holes with bottoms can be tapped with the same facility as others, care being observed to have the unlocking take place before the end of the tap touches the bottom of the hole. This arrangement entirely prevents the danger of breaking the tap, for, if the motion is not reversed by the operator as soon as the stop strikes, the continued motion of the tap withdraws the dog in the arbor from the clutches in the pulley. The taps are made from straight pieces of round steel wire and are held in the following manner. A straight hole is drilled in the end of the arbor about three inches deep, and of a little larger diameter than the wire from which the taps are made. At the outer end, this hole is tapered for half an inch in depth at an angle of 80°. A piece is then turned to fill this taper and to project slightly beyond the end of the arbor. This piece is bored the size of the tap wire and a slit is cut through one side to the hole in the center. It will be readily understood that if a wire, filling the hole in this tapering piece, is inserted in it, and the piece itself then forced into the tapering hole in the end of the arbor, the wire will be held firmly. This is effected by a screw cap fitting a thread cut on the end of the arbor and having a hole in the center to admit the tap. For tapping the small parts of guns, sewing machines and other light work, this machine is particularly useful, and it has been introduced into several of the principal armories in the country. It is manufactured by J. R. Brown & Sharpe, at Providence, R. I., to whom those interested can apply for further information.

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

Military matters are progressing as rapidly as possible. General McClellan is pushing "on to Richmond" with rapid strides. At last accounts he was within twenty miles of that city, and it was expected by some that the enemy would make a stand at a point called Bottom Bridge, while others assert that Virginia will be evacuated as rapidly as possible. Gen. McClellan needs the active cooperation of the divisions of Gen. McDowell and Gen. Banks. We are of the opinion that injustice was done when these commands were taken away from him. This is our conviction, but we may be wrong. The responsibility of defeating the enemy in Virginia devolves chiefly upon him, and if for want of control over these two divisions he should be defeated the odium of failure would be unjustly charged to him.

Gen. Halleck is almost within speaking distance of Beauregard at Corinth, and is skirmishing with him daily. A great battle at that point is impending.

Some of our journals are loudly proclaiming that the war is nearly over. We should be happy to re-echo this pleasing idea, but we warn our readers against being too sanguine on this point. The rebellion will be crushed we have no doubt, but it is all nonsense to set the time when this will be brought about. It may be one month, it may be six, it may take twelve to crush it, but it must be done.

CAPTURE OF NORFOLK—DESTRUCTION OF THE "MERRIMAC" AND THE NAVY YARD.

One of the most important successes which has attended the operations of the Federal government in its efforts to suppress the rebellion is the surrender of the city of Norfolk and its occupation by our troops. This event took place on Saturday, the 11th inst. The President and Secretary of War had proceeded to Fortress Monroe, with a view, no doubt, to secure a more efficient cooperation of the naval fleet in Hampton Roads with the military operations of Gen. McClellan. After their arrival the iron-clad gunboat *Galena* proceeded up James river, toward Richmond, and the *Monitor*, *Navagatuck* and other vessels went toward Norfolk, with a view to shell out Sewell's Point, and, if possible, draw out the *Merrimac*, to engage her in conflict, but she refused to come out. The batteries on the Point were effectually shelled, and the President in person decided to land forces, for the purpose of moving upon Norfolk, and,

after a most careful reconnoissance, selected the spot for the landing. After the forces under Gen. Max Weber had proceeded some distance toward Norfolk he was joined by Gen. Wool, Secretary Chase, and Gens. Mansfield and Viele. Gen. Wool took every precaution to provide for all emergencies that might arise, by ordering up reinforcements. The entrenched camp of the enemy, some three miles in extent, was found deserted, and no serious obstacle presented itself to the advance of our forces. Upon reaching the immediate environs of the city a deputation of citizens was met, bearing a white flag, headed by the Mayor and a portion of the Common Council, who made a formal surrender of the place. Gen. Wool proceeded to the City Hall, where he was well received by the inhabitants, and announced to the people that he had taken military possession of the place and appointed Gen. Viele Military Governor. In his proclamation the Governor stated that "those who had left their homes under the anticipation of any acts of vandalism may be assured that the government allows no man the honor of serving in its armies who forgets the duties of a citizen in discharging that of a soldier, and no individual rights will be interfered with."

The huge iron-clad war steamer—the *Merrimac*—which has created so much stir the world over, and which was the terror of the bulls and bears of Wall street, has finally become extinct. She was blown up on the morning of the 11th, in order to prevent her from falling into our hands. The explosion is described as grand and terrific. It seemed like the shock of an earthquake.

Accompanying the report of the occupation of Norfolk was also the announcement that the Gosport Navy Yard was safe and untouched. We could not credit the report, yet it seemed to be official, and we hoped it might prove true. Information, however, is received, that all the workshops, ship houses, and splendid dry dock were destroyed, together with several vessels in the yard and on the stocks, nothing remained but the charred remains of what was once the most complete and best-equipped navy yard in the country. Gen. Wool, in his dispatch, says "I visited Craney Island, where I found 39 guns of large caliber, most of which were spiked; also a large number of shot and shell, with about 5,000 pounds of powder, all of which, with the buildings, were in good order. As far as I have been able to ascertain, we have taken about 200 cannon, including those at Sewall's Point batteries, with a large number of shot and shell, as well as many other articles of value stationed at the navy yard, Craney Island, Sewall's Point and other places.

OCCUPATION OF NEW ORLEANS.

The latest intelligence from New Orleans announces that the city is now fully occupied by the Federal forces under Major-Gen. Butler. He has taken the famous St. Charles Hotel for his headquarters, and has issued a sound and judicious proclamation, placing the city under martial law. Mayor Monroe and the aldermen of the city have been cast into prison as traitors. The General sent his proclamation to the various newspapers published in the city, but they all refused to print it. Therefore he took possession of the *True Delta* office and called in Northern printers, who worked it off speedily. The people are represented as very sour, but Gen. Butler plainly informs them that, while he will protect them in their rights of person and property, he will at the same time not submit to any thing like treason against the government, either in word or deed. No non-sense of that kind can be tolerated under the ample folds of the star-spangled banner.

INCIDENTS ON THE MISSISSIPPI.

The official reports of Commodore Farragut and Capt. Porter, concerning the engagement which resulted in the capture of New Orleans, proves it to have been one of the most brilliant naval victories on record, perhaps the most so, considering the great preparations which had been made on land and water to resist the advancing fleet. Capt. Bailey, who brought the official report of the surrender of Forts Philip and Jackson, states that just previous to the attack the commanders of the French and English men-of-war, which were lying in the river, asked and readily obtained the consent of Commodore Farragut to visit the forts—their object being to examine the means of defense. The officers reported to the Com-

modore that it would be useless for him, with his wooden ships, to attempt to battle with forts so thoroughly prepared to resist an attack. The gallant Commodore replied that he was sent by his government to make the attack, and intended to try it on at all hazards. Our fleet had to contend with regular casemated forts, heavily-armed land batteries, iron-clad gunboats, rams, turtles, chains, floating rafts, fire ships, &c., all of which had to give way in the presence of the skill and bravery of our gallant tars.

ANOTHER NAVAL ENGAGEMENT.

A naval engagement came off on the 10th inst. near Fort Wright, on the Mississippi, between Commodore Foote's fleet of gunboats under command of Capt. Davis, and the Confederate fleet, under Capt. Hollins. The Federal gunboat *Cincinnati* was run into and injured by the *Louisiana*, but will soon be again repaired. The rebel ram *Mallory* attempted to do the same thing for the *St. Louis*, but was destroyed in the attempt. The rebel fleet retired down the river—satisfied for the time being that it would be useless to contend further. The *Memphis Argus*, in an article on gunboats, says:—Thus far, it must be confessed, our attempts with the gunboats on the river have been a disgusting fizzle. The people know it, and so does the government.

THE FLEET OFF MOBILE.

The Petersburg (Va.) *Express*, of the 9th inst., publishes a dispatch from Mobile which states that the advance of the Federal fleet, consisting of seven vessels, are off Fort Morgan and ten more off Horn Island, moving Eastward. This confirms the announcement of Com. Farragut, that he intended to follow up the stampede of the enemy to Mobile. Stirring news may soon be expected from that quarter.

CHAIN-CLAD SLOOPS-OF-WAR AT NEW ORLEANS.

The most conspicuous feature in the outward appearance of the Federal fleet was the iron-linked mail of the sloops-of-war *Richmond*, *Brooklyn* and *Pensacola*, each of which had their engines and boilers protected by chain-cables hung in bites on the outside and triced to eye-bolts and rods running fore and aft. The chains were propped from the height of the gun-deck to below the water line, and connected together by strong cordage. This was equivalent to four inch plates, provided it withstood the effects of glancing or oblique shots. The only danger apprehended from the chains on the steamers was from raking shot tearing them off, in which case it was feared they would become entangled with the propellers. To guard against this, some of the ships unshackled the chain in short lengths, so that it might reach astern. The machinery of the *Iroquois* was protected in the same way, the credit of originating which plan is due to Assistant Engineer Hoyt of the *Richmond*, upon which ship it was first adopted, the other vessels following her example.

Among the most efficient of the internal arrangements for the protection of the boilers, the destruction of which by a shot or shell was the most to be dreaded, although this was not the only dangerous part of the ships, was that adopted on board the sloop-of-war *Mississippi*, the machinery of which, being more above the water line, was consequently more exposed to the fire of the enemy. The preparation of this ship for the action involved an immense amount of labor, which engaged her officers and crew for weeks before the attack. Under the direction of Chief-Engineer Lawton, Mr. Bartleman, the First-Assistant, worked night and day with a strong force, and constructed a temporary roof in the coal bunkers just below the water line, about which the heavy chain cables of the ship were packed in layers, running fore and aft. The ends of the shaft of the *Mississippi* were protected by four bales of baggage on the outside of each wheel. The haws of several of the ships, including the *Richmond* and *Hartford*, were protected by sandbags piled up beneath the fore-castle, and intended to be removed aft to break the force of raking shot after the ships should have passed the forts. The bulkheads of other gunboats were strengthened in like manner, and also by sand bags, and the coal bunkers of all being kept full, supplied the wants of extra barriers to shot and shell. From the moment the sloop-of-war *Portsmouth* arrived in the river, her officers and crew were engaged in putting the ship in fighting trim. She wore a mail, constructed of her sheet chains, for the protection of her bow against a raking fire, and spread a complete

spar netting of strong ropes to prevent her lofty spars—cut away by cannon balls—from falling on deck.

SKILLFUL PREPARATIONS.

The sloop-of-war *Richmond*, taken altogether, was by far the best fitted ship in the squadron. Her hull, standing rigging, and in fact every part of the vessel which could afford the least mark for the rebel artillery, received a coating of mud paint; she wore splinter nettings, inside of her bulwarks, and spar nettings running fore and aft over her decks. In addition to the iron mail, which she wore externally, her machinery was protected by sand bags, packed against her bulk-heads.

The gunboats *Katahdin*, and the *Harriet Lane* wore their boarding nettings, and other gunboats and ships were provided with the same barriers against the enemy. Many of the ships carried kedge anchors on their yard arms, and grappling hooks on their jib booms, with which to fasten to the gunboats and fire rafts of the enemy.

All of the sloops-of-war carried howitzers in their tops, those on the *Hartford* and *Mississippi* being inclosed with plates of boiler iron for the protection of the men, while the *Hartford*, *Pensacola* and *Brooklyn* wore a screen of cordage around their fore and main tops.

Over nine thousand shells were thrown by the fleet in the bombardment of the forts below New Orleans. Most of them were 13-inch shells which cost with their filling nearly \$20 each.

RE-OPENING OF SOUTHERN PORTS.

The President of the United States, by proclamation, announces that on the 1st of June the ports of Beaufort, N. C., Port Royal, S. C., and New Orleans will be re-opened to commercial intercourse, except as to persons and things and information contraband of war.

LAUNCH OF THE NEW IRON-CLAD SHIPS.

The new iron-clad ship-of-war, built by Messrs. Cramp & Son, of Philadelphia, was successfully launched at Kensington, Philadelphia, in the presence of an immense crowd. The christening was performed by the veteran Commodore Stewart, of the old *Ironsides*, at whose suggestion the name of *Ironsides* was given her. She will be a very formidable vessel, and is expected to go into service about the 1st of July.

Cause of the Motion of Camphor on Water.

Mr. Charles Tomlinson recently made a communication to the Royal Society detailing his investigations into the cause of the singular movements of small pieces of camphor when floated upon water. This phenomenon has long been known, but has never before received a satisfactory explanation. Mr. Tomlinson finds that the movements only occur when the camphor is placed upon perfectly clean water, contained in a clean vessel, and that they may be imitated by smearing any small floating objects with a volatile liquid, such as ether, chloroform, &c., and the floating it upon water; when the camphor or other volatile substance, being slightly soluble, spreads in a film over the surface of the water. These films are, however, not given off uniformly, but separate more quickly from the sharp angles and broken surfaces than from the smoother parts of the camphor, &c., and passing off in straight lines re-act upon the fragments of camphor, causing them to rotate in the opposite direction to that in which the film is passing off. Mr. Tomlinson has devised an ingenious method of rendering these films visible, by fixing the pieces of camphor and then dusting the surface of the water with lycopodium powder, when the currents produced by the passing off of the films are rendered distinctly visible. The irregularity of the movements depends greatly on the influence exerted by the different pieces of camphor on each other, and also on the attraction of the sides of the vessel. It may be noticed that a piece of camphor, when placed in water, wastes much more quickly at the surface of the fluid than above, where it is exposed to the air, or below, where it is acted upon solely by the water; this is owing to the film which is constantly being formed, and which evaporates into the air as rapidly as it is spread out on the surface of the water. Whatever interferes with rapid evaporation tends to arrest the singular phenomenon; therefore the movements are not nearly so lively on a dull, foggy day as on a bright, shining

one, when evaporation goes on with great rapidity. Any fixed oil, or the slightest greasiness of the water, or of the containing vessel, will, by producing a fixed film on the surface, prevent the formation of the camphor film, and so interfere with the occurrence of the interesting movements.

UNITED STATES CIRCUIT COURT—OHIO.

Manufacture of Candles—Important Patent Case.

Tilghman vs. Werk.—A very important chemical case was recently decided at Cincinnati. It was heard before Judge McLean and Judge Leavitt, shortly before the death of Judge McLean. It involves a saving, it is said, of nearly one cent a pound in the manufacture of candles. The outline of the case is as follows. Richard A. Tilghman, of Philadelphia, invented a process for decomposing neutral fats into fat acid and glycerine by the simple use of highly heated water under pressure. Prior to his invention the neutral fats were decomposed into fat acid and glycerine by the use of lime and sulphuric acid, or the glycerine was destroyed and the fat acid set free by another process. A patent was granted to Tilghman on October 3, 1854, and a suit was brought against M. Werk, of Cincinnati. The defendant alleged that the plaintiff was not the original and first inventor of the process patented, but that substantially the same process was described in Payen's Chemistry in the year 1851; in Regnault's Chemistry in 1853, and in Roret's Encyclopedia. The defendant also denied that the process or plan employed by him was infringement of the complainant's patent. A large amount of scientific testimony was taken, among others, Professor R. F. Rogers, James C. Booth, Professor Wayne and Grasseli were examined. The case was argued by George Harding and Henry Stanberry for complainant, and by Charles Fox and Nathaniel McLean, Jr., for defendants. Judge Leavitt delivered the opinion at the last term of the Court. A motion was afterward made for a rehearing before Judge Swayne and Judge Leavitt, and refused. The points decided were the following:—

1. Plaintiff's invention consists in a process for manufacturing free fat acids and glycerine, by the action of water in a liquid state above the ordinary boiling point of water, and consequently under pressure on fatty bodies or substances.
2. The invention is based on a discovery made by plaintiff that water highly heated and under pressure, of itself, possesses a chemical power of decomposing fat bodies into their elements, fat acid and glycerine.
3. This invention and discovery are not contained in the books relied on by the defendant. Regnault's and Payen's process acts by destroying the glycerine, and does not mention highly-heated water under pressure as the decomposing agent, and is therefore unlike the plaintiff's.
4. Milly & Motard's process, described in Roret's Encyclopedia, although using a close boiler containing fat and water under a high temperature and pressure, yet does not rely on the chemical decomposing power of highly-heated water, but requires the presence of lime to combine with all the fat, and thus prevents the formation of any free fat acid, and is therefore unlike the plaintiff's.
5. Arthur Dunn's process by use of soda is similar to that of Milly & Motard, and unlike the plaintiff's.
6. The plaintiff's invention is a useful and practical one.
7. The description of the process is sufficient in the specification. A fixed rule is there given, which will certainly insure success, and it is also made known that certain variations may be made without changing the process.
8. A principle and a process distinguished. The invention claimed by plaintiff is not merely a principle, but also a process by which that principle may be made practical and operative.
9. The process used by defendant is an infringement of plaintiff's patent:—
 - I. Defendant uses and requires water in his process.
 - II. That water is highly heated and under pressure.
 - III. That water decomposes a certain portion of the fatty body into free fat acid and glycerine, and to this extent infringes.
10. The defendant also employs six or seven pounds of lime to one hundred pounds of fat, and thus converts a certain portion of fat into lime soap, and that portion of the operation does not infringe.
11. Where a patent is for a process a defendant cannot avail himself of the process to a partial extent without infringing.
12. The amount which the plaintiff should recover is to be measured by the profit which the defendant has derived from the adoption and use of the plaintiff's invention.

INJURIOUS ACTION OF IODINE ON THE TEETH.—The

Dental Cosmos says:—M. Stanislas Martin has found, as the result of repeated inhalations of iodine in the treatment of phthisis, that the gums become very sensitive and swollen. The alveolar dental periosteum next suffers, and the teeth soon lose their solidity. The mouths of some persons, however, seem insensible to the iodine. He has formerly shown that sugar and camphor exert a deleterious action on the teeth themselves, decomposing them and leading to their loss; and he believes that the same is true with regard to iodine, which especially attacks the carious teeth, and those the enamel of which has become damaged by the heat communicated to the mouth by smoking. He has now under examination some teeth completely saturated with iodine.

We are indebted to Hon. Ira Harris, for valuable public documents, also to Hon. Mr. Kellogg and Hon. Mr. Casey, for similar favors.