Further, from cauline a black extract can be produced, which dyes leather blue black. Besides these coloring matters, Messrs. Savigny & Collineaux exhibited at the same time a great variety of tasteful patterns dyed with their new products.—*Textile Manufacturer.*

Precautions against Photographic Forgeries.

Recently a number of London banks have printed in color on their checks their names in microscopic characters, repeated over and over so as to form a sort of pattern. The object of this microscopic printing is twofold. The erasing of a word or figure upon a surface of small print of this kind cannot be done without erasing some of the tiny words as well, and as these obviously cannot be restored, there is no way of covering up such erasure; in the second place the printing in color of such tiny letters is deemed sufficient to baffle any attempt to copy a check by means of photography. No doubt the bank authorities are right in their conjecture that it would be impossible to secure a copy of one of their checks before the camera, printed as the document now is; but for all that, the *Photographic News* deliberately expresses the opinion that a check of this kind is not nearly so safe as the finely executed checks in plain black and white of the Bank of England. Proof of this assertion is found in the recent successful use of photography in France in imitating colored checks. Even the blue notes of the Bank of France have not escaped these *chevaliers de l'industrie;* and it is but a year or two ago that the French police were enabled to make a seizure

Just after the Franco-German war, when bank notes were exceedingly prolific with the French, there were large numbers of the spurious blue notes in circulation; and on the principle of setting a thief to catch a thief, the Direction of the Bank of France at once invoked the aid of photography to detect photographic forgeries. M. Gobert, a well known member of the French Photographic Society, and an accomplished photographic chemist, was retained by the Bank of France as adviser, and it is in a great measure due to him that abatement of photographic forgeries in France is due. Many years ago Mr. Spiller was called in as scientific referee in the matter of color printing upon checks, and gave much excellent advice upon this subject; but, unfortunately, English banks do not keep pace with the times, and what was impossible twenty years ago, is perfectly feasible at the present moment.

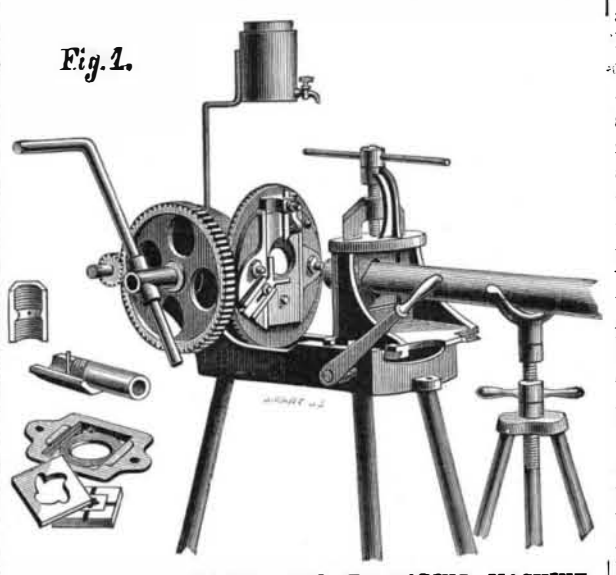
The German authorities used to consider that they had altogether defied imitation by having recourse to very fine printing at the back of their bank notes—similar to that on the checks of the Check Bank, London and Westminster, London and County, etc.—this fine printing, which was in black, setting forth the severe penalties which would be visited upon those who endeavored to forge such documents. This fine print, rather than acting as a barrier, resolved itself rather into a premium for copying by photography. The bank note was put under a microscope or magnifier, and the tiny printing thus enlarged, it could then be imitated by an engraver, and the photographer had simply to photograph the copy in order to produce the small printing. And so, the *News* is inclined to believe, the microscopic printing in color, rather than acting as a safeguard against the production of spurious checks, will render the matter somewhat more easy. The color—whether it is applied as a simple tint, or in the form of microscopic words—serves the purpose in a forgery of covering up defects in the engraving of the check. Rather, therefore, than adding to the difficulty of copying, it rather lightens it, since the work not being in pure black and white need not be so faultlessly executed. This is why the blue applied to the Bank of France was no protection.

Photographers, nowadays, know a good deal about the sensitiveness of various collodion films for different colors, and are also well versed in what may be done by under-exposure and over-intensifying, and *vice versa*, and there are few tints or designs that they cannot copy one way or another; and by having recourse to combination printing, a skilled operator will overcome the most stubborn opportunities. But there would be no need, of course, in order to imitate a modern check to copy the minute blue or pink printing upon them. This would be produced of large size; a reduced negative, executed with the type of proper dimensions, and impressed upon a colloid film, would be capable of yielding any number of impressions and in any color; while as to fineness of the type and freedom from blurring, the result would simply be more perfect than the majority of checks with which the public deal. Any one who has seen the fine details of a map reproduced upon a colloid film, the delicate shading and minute lines, will readily believe this, while we may point out that scarcely less perfect work is produced nowadays by a phototype process. The finely executed drawings we see upon the *Graphic Programme* and other theatrical publications, which are as delicate as anything done by engraving, are all prepared by the aid of photography, the original sketches, in the first instance, being produced many inches high. The lines are fine and black in the originals, and in the course of reduction become, of course, exceedingly delicate; thus it is that the drawings appear so refined beside an ordinary woodcut. These facts are recited to show how the graphic arts have improved of late by the aid of photography, and to point out that what might have been impossible some years ago is perfectly possible at the present day; and to this fact the bank authorities should give attention. Certainly, microscopic printing in colors cannot be relied upon at the present moment as a safeguard against the forging of checks; for a skilled hand would have more difficulty in counterfeiting the black and white document issued by the Bank of England than one in which a combination of colors is to be found.

A LABOR-SAVING TOOL.

The annexed engraving represents a very effective and simple pipe cutting and threading tool manufactured by the Chase Machine Company, New York city. This invention enables the workman to perform with ease one of the most tedious and laborious operations in mechanics, and it does its work expeditiously and perfectly. It is capable of cutting regular chips in the same manner as a lathe, leaving the work smooth and perfect. It will form a thread on all sizes of pipe from ¼ inch to 2 inches inclusive. To steam fitters, gas fitters, and machinists it will prove of great value, and car shops, steamers, sugar refineries, distilleries, should be furnished with these machines. Wherever it is required to thread pipes or bolts, or to tap nuts, this machine will be found efficient and satisfactory. The machine is capable of making nipples, and is provided with an automatic cut-off. In its construction it is very strong and well adapted to the work for which it is intended. All the gears are cut and it is well finished in every part. It may be

Fig. 1.



CHASE'S PIPE CUTTING AND THREADING MACHINE.

worked by hand or by any convenient power, and it may be readily adapted to different kinds of work. It will operate equally well on wrought iron gas and steam pipes, boiler tubes, oil well tubes, brass and copper tubes, rods, bolts, etc. For further particulars, address The Chase Machine Company, No. 120 Front St., New York city.

Torpedo Investigations.

Brevet Brigadier General H. L. Abbot read a paper on "The School of Submarine Mining at Willett's Point" at the recent meeting of the United States Military Service Institution on Governor's Island. The paper contained the following information of general interest:

The first subject of study was to secure the best explosives for submarine warfare, and types of all explosives known to science were used with the result of finding the best for the service to be dynamite, consisting of 75 per cent of glycerine and 25 per cent of Keiselguhr. The element of time proved to be one of extraordinary importance with explosive compounds. Nitroglycerine under water develops but about eight tenths the intensity of No. 1 dynamite. The interposition of a wooden case between the charge and the water was found to greatly reduce the kinematic energy available. In order to discover the laws of transmission of a shock horizontally through water a wrought iron frame was used, and the charge secured at the central part, and gauges placed symmetrically with respect to a horizontal plane passing through it were secured at angles between the transverse frames. The results proved that the same formula can be used for all modern explosives by substituting the right numerical value for one constant. By this the relative value of explosive compounds can be fixed and the intensity of action computed. To learn completely the destructive range for subaqueous explosions, it was necessary to learn the intensity of action needful to destroy a first class ship of war. For this purpose an iron target twenty feet square was used to represent the bottom of a vessel made on the double cellular principle; and a numerical value for the intensity of action needed was found. From English tests. by aid of the previously mentioned formula, a second value of this element was reached, and some trials on a very strong wooden raft gave a third value. The three were so accordant that the value adopted by the Board of Engineers is satisfactory, and the size and range of the charge have been accordingly fixed.

The three essential conditions of a torpedo are endurance in sea water, power to resist shocks of explosions in the vicinity, and strength to resist the blows of friendly vessels in passing. Experiments to secure these objects have been carried on for six years, and a torpedo has been adopted finally which is believed to be superior to any abroad. Ground torpedoes are cast iron spheres resting on the bottom on their truncated base. Buoyant torpedoes are spheres of steel of a size suited to the strength of the current. For firing mines the active agent is electricity. The subject of the fuse has been exhaustively studied and new methods of research undertaken. Over eighty patterns of foreign and domestic varieties have been compared and are now in the museum at Willett's Point. The one finally adopted retains its action after years in a torpedo and is absolutely certain.

For the operation of mines a very superior system has been adopted and is kept secret. It allows the safe passage of friendly vessels, and causes explosions when struck by the enemy; or any one can be fired, every part can be tested, and an injury determined. In important harbors the electric light will be used in the system of defense. The form of lens adopted throws a concentrated light to any desired spot, but its use is impaired when the air is rendered opaque by moisture or smoke, as the particles in the air are brightly illuminated and form a screen to hide the object. Experiments with fish torpedoes have also been made, and one recently tried showed excellent results. The control of the fish was perfect, as it could be stopped, started, or turned in any direction.

The New System of Signaling at Sea.

The following system of ocean and river signaling has been agreed to by the governments of Great Britain, France, Germany, Russia, Italy, Spain, Portugal, Belgium, Denmark, Sweden, Netherlands, Austro-Hungary, Greece, Chili, and the United States of America. Besides the usual colored lights, a steamer discerning another steamer or sailing vessel in sight has to sound with the steam whistle or fog horn a short blast, which will mean "I am directing my course to starboard;" two short blasts will signify "I am directing my course to port," and three short blasts, "I am going full speed astern." In fog, mist, or falling snow the signals are to be repeated every two minutes, a prolonged blast indicating that the vessel is under way; an ordinary blast, that the vessel from which it proceeds is on the starboard tack; two blasts in succession, "I am on the port tack;" and three blasts in succession, the wind abaft the beam. A vessel in fog, not under way, has to ring the bell every two minutes. Concurrent with the foregoing are ocean signals. The Thames Conservancy are issuing rules of road, which are to take effect on British and foreign ships entering the River Thames. Where steamers are proceeding one up and one down the river, involving a risk of collision, they are to pass port side to port side. If there be no risk of collision they will both keep their course and pass either starboard side to starboard side or port side to port side. In rounding a point, like that where the Princess Alice collision occurred, the steamer going against the tide is to wait under the point until the vessel going with the tide has passed clear. Where a steamer and a sailing vessel are proceeding in a direction likely to involve a collision, the steamer has to slacken speed to keep out of the way of the sailing vessel and let the latter pursue her course. If the steamer cannot possibly or safely get out of the way she is to blow four blasts and slacken speed, and the sailing vessel is to keep out of the steamer's way.

Influence of Plants on the Products of the Dairy.

The Agricultural Museum, of Berlin, lately exhibited at the Dairy Exhibition a collection of plants which may influence the different products of the dairy. The catalogue gave the following list:

1. Plants which coagulate milk: the milky juice of the fruit of *Aspidosperma quebracho*, Lor., used in the Argentine Republic; the milky juice of the unripe fruit of *Carica papaya*, L., Papaw tree; *Cirsium arvense*, Lam., Canada thistle; *Cynara cardunculus*, L., Chardoon; *Ficus carica*, L., Fig; *Oxalis acetosella*, L., Wood sorrel; *Piper nigrum*, L., Black Pepper; *Quercus infectoria*, Oliv., Gall Oak; *Rumex patientia*, L., Garden Patience.

2. Plants which prevent the coagulation of milk: *Cochlearia armoracia*, L., Horseradish; *Pinguiculavulgaris*, L., Common Butterwort; *Sanicula Europœa*, L., Wood Sanicle.

3. Plants which are used to color butter and cheese: *Bixa orellana*, L., Annatto; *Calendula officinalis*, L., Marigold; *Carthamus tinctorius*, L., Safflower; *Crocus sativus*, L., Saffron; *Curcuma longa*, L., Turmeric; *Crozophora tinctoria*, Ad. Juss., Turnsol; *Daucus carota*, L., Carrot; *Morus tinctoria*, L., Fustic. [Also *Galium verum*, L., Cheese-renning Bedstraw, or Yellow Bedstraw.

4. Plants which are used to flavor cheese: *Melilotus cœrulea*, L., Blue Melilot; *Penicillum glaucum*, Lk., Blue Penicillum.

5. Plants used to prevent rancidity in butter: *Rumex Abyssinicus*, Hochst., Abyssinian Sorrel.

6. Plants which impart to milk a peculiar color, after being eaten by cows: (*a.*) reddish: *Galium verum*, L., Yellow Bedstraw; *Rubia tinctorum*, L., Madder. The same is said of species of *Carex, Scirpus, Equisetum, Ranunculus, Euphorbia*, and of young twigs of pine, etc. (*b.*) yellowish: *Daucus carota*, L., Carrot; *Rheum palmatum*, L., Rhubarb. (*c.*) blue: *Anchusa officinalis*, L., and *A. tinctoria*, L., Alkanet; *Butomus umbellatus*, L., Water Violet; *Melampyrum arvense*, L., Purple Cow-wheat; *Mercurialis perennis*, L., Perennial Mercury; *Polygonum aviculare*, L., Common Knot Grass; *Polygonum Fagopyrum*, L., Buckwheat; *Rhinanthus major*, L., Yellow Rattle.

7. Plants which impart a peculiar, often acrid taste to milk: *Allium ursinum*, L., Ramsons; *Artemisia absinthium*, L., Wormwood; *Brassica napus*, L., Rape; *Brassica rapa*, L., Wild Turnip; *Euphorbia cyparissias*, L., Cypress Spurge; *Gratiola officinalis*, L., Hedge Hyssop; *Helleborus niger*, L., Black Hellebore; *Matricaria Chamomilla*, L., German Chamomile; *Zea mays*, L., Maize; —*From Industrie Blätter.*—*New Remedies.*