STENCIL COPYING PROCESS.

By the following process one thousand or more copies of writings or drawings may be obtained with the gelatine tablet.

Fine linen or bank-note paper is coated over on one side by means of a camel-hair varnish brush, with a clear solution of one ounce of pine resin in four ounces of absolute alcohol. When this coat has dried another is put on.

The ink used on this prepared paper is prepared from—

Water	1 ounce.
Caustic potash	1 "
Vandyke brown, to color	q. s.

The writings or drawings are executed with an ordinary pen on the coated side of the paper. The paper is then floated on the surface of clear water, written side up, with care to avoid wetting the upper side. In about ten minutes the lines will appear swollen, and then the paper is taken out by one corner and placed, writing downward, on a blotter. The back of the paper having been washed over with a camel-hair brush filled with water, the paper is turned on the blotter and washed in a similar manner until the ink disappears; the sheet is then dried between blotters, when it is ready for use.

The tablet composition is prepared by dissolving by aid of heat over a salt water bath one ounce of Cooper's gelatine, previously softened by soaking it in a little cold water over night, in six ounces of best glycerine, and pouring the solution out in a shallow tin pan. This pan may be half an inch deep, ten inches wide, and fourteen inches long. When the composition is poured in it should stand level, and should remain in this position for twelve hours. The surface of the tablet should be sponged over with cold water and dried before using.

Place the stencil paper, written side down, smoothly upon the tablet, and with a small paste brush paint over the back of the paper with an ink prepared from—.

Aniline violet, best	1 ounce,
Glycerine, pure	1 "

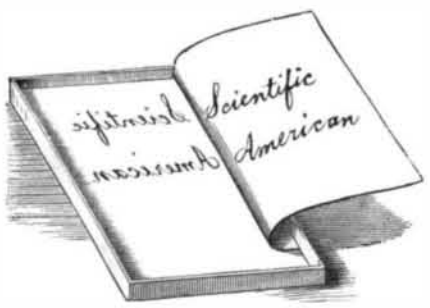
by triturating them together in a hot mortar and allowing the ink to stand for twelve hours or more before using it.

Place over the inked sheet another (blank) sheet of the prepared paper, rub the hand firmly over it, and put a weight of two or three pounds on it; a book or smooth board with a quantity of printing paper beneath it does very well.

In about half an hour this weight may be removed and the stencil paper carefully separated from the tablet, leaving a strip of half an inch of it adhering at the side and turning the sheet over the edge of the pan, as shown in the illustration.

If the manipulations have been properly conducted a reversed copy, in the aniline ink, will be found on the tablet, and from this a large number of positive copies may be obtained in the usual manner—by spreading a blank sheet of paper on the tablet and passing the hand gently over the paper.

When the print becomes faint the stencil may be folded over and pressed against the tablet as before, the adhesion of the edge of this stencil securing, with a little care, proper registration and the rubbing re-enforcingthe transfer. A few minutes is all that is required for this re-enforcing.



STENCIL COPYING TABLET.

The stencil should be turned back on a cardboard, keeping the blank sheet under it.

This stencil paper is semi-translucent, so that in copying drawings, wood engravings, etc., it may be used as a tracing paper.

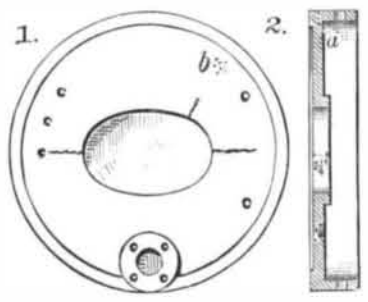
In floating the stencil on the water care should be taken that no air bubbles are left under the paper.

INTERESTING TEST OF CAST IRON BOILER HEADS.

Messrs. Sidebotham & Powell, proprietors of the Frankford Boiler Works, in Philadelphia, the firm who made the exploded Gaffney & Co. boiler, that was illustrated in the SCIENTIFIC AMERICAN of July 9, 1881, having been censured by certain local experts for having made a poor boiler for Gaffney & Co.—hence the explosion—determined to test a short model section made in the same manner by bursting it with hydrostatic pressure.

The experiment was made on the afternoon of July 13, at their works, Frankford Road, in the presence of a large number of invited mechanics, manufacturers, and experts, among whom were inspectors of the city and of the Hartford Insurance Company, and nearly all the coroner's jury whose late verdict made such a sensation in Philadelphia, on account of its virtual condemnation of flat cast iron heads

The tested boiler was composed of a single plate of No. 3 boiler iron of the best quality, single riveted, in the form of a hollow cylinder, 42 inches long by 36 inches diameter, having two flat cast iron heads, one of which had the same sized man hole and the identical plate that blew out of the Gaffney & Co. boiler. The number and size of the holes were the same as in the exploded boiler head, which was cast from the same pattern. A hand pump used by the city inspectors was used to force in water. In addition to the holes that were in the exploded head one was made at *b* and a plug inserted to stop a leak. When the pressure reached 450 pounds per square inch the head having the man hole gave out, without noise or shock, by cracking on lines each side of the man hole opening on the large axis of the oval six inches each way, and another radial crack about two inches long at the upper right hand curve, thus:



The head was then taken out after unsuccessful attempts had been made to complete the breaking of it by sledges, and an examination of the inside showed a circular crack near the angle of the flange at *a*, extending one-third or more round the circle. The breaking up of the casting was then completed to compare the texture of the metal with that of the old head, which was at hand for the purpose.

The result indicates that cast iron has still some reliability as a material for boiler heads. This sample that gave out was not more perfect than the Gaffney head; in fact it showed pin-hole leaks at *b*, Fig. 1, when the pressure reached about 200 pounds, and a number of defects were seen in the circular fracture. The outward deflection of the unbroken head at the other end of the cylinder was noted and found to be three-sixteenths of an inch outward bulging at the center.

This test was, in the minds of all unprejudiced persons who saw it, a complete vindication of Messrs. Sidebotham & Powell, and goes to show that both their work and their judgment were good. The ultimate strength of the weakest part of this experimental boiler being 450 pounds, the rule that allows a factor of one-fifth would give 90 pounds as the safe working load for it. The whole indicates that the pressure on the Gaffney boiler was something enormous at the time of the explosion, as no shock is believed to have taken place.

The Philadelphia *Record* gives the following particulars:

"When everything was in readiness the pressure was applied. The usual seeping at the rivets was apparent when the gauge registered 105 pounds, but beyond this the boiler did not exhibit any symptoms of a strain. At 130 pounds the water began to ooze through a small sand-hole in the head, above the man-hole, showing that the head was slightly defective. The pressure was then reduced, while Inspector Overn affixed a contrivance to the rear end for the purpose of measuring the extent of expansion. Pressure was again applied until the gauge marked 140 pounds, then 160, 180, and 200. At this moment of pressure the seams on the side of the boiler began to weaken, and from one spot a spray of water as fine as steam was discharged. At 250 pounds this had increased to a good-sized squirt, and at 350 the water was issuing with such force as to be thrown four feet away. Still the heads remained intact. At 400 pounds half a dozen similar fissures appeared in a close row in the same seam. The pressure was then gradually increased to 425 pounds, and the lookers-on were beginning to wonder whether the boiler would hold out forever, when a sudden crack was heard in the front head, and the water commenced to run down from a fissure extending half way across the head. The gauge showed that the boiler had given out at a pressure of 450 pounds. Had it not been for defects, the head would probably have stood an additional 50 pounds pressure before giving way. The measurements taken by Inspector Overn showed that the rear head had expanded one-sixteenth of an inch at 200 pounds, and three-sixteenths at the time of the break.

"The members of the Coroner's jury had little to say concerning the result. Three of the five sat some distance away while the pressure was being applied, and apparently took but little interest in the proceedings. Before leaving they held a short confidental consultation, in the course of which one remarked: 'This is no reflection on us. If we undertake to answer it we shall never be done of the subject.' 'Yes,' responded another, 'we would start a discussion which would never end.' Several of the jurymen, when asked to give their opinion of the experiment, emphatically declined to express themselves on the subject.

"Several weeks ago, when the Hartford Company decided not to pass any boilers with flat cast-iron heads over 32 inches in diameter, City Inspecter Overn addressed a communication to City Solicitor West, asking what authority, if any, the City Inspector could exercise in the same direction, and also requesting advice as to how he should govern himself in passing upon steam boilers. In reply, the City Solicitor says that the questions are more fitted for a mechanical expert than for a lawyer, but that legally he would advise the inspector when, in his judgment a boiler is safe, to approve it and give a certificate, without regard to its mode of construction or the material used. Mr. Overn has consequently decided to adhere to his usual practice of passing all boilers with the obnoxious heads if they have safely withstood the cold water test."

The American Institute and the Atlanta Cotton Fair.

To facilitate the transportation and care of exhibits from this region for the Atlanta International Cotton Exposition, the Board of Managers at Atlanta have authorized a committee of the Farmers' Club of the American Institute to arrange for a "collective exhibit" comprising a variety of subjects. This gives to manufacturers and others who do not care to go to the expense of making an individual exhibit to have their goods shown there at a nominal expense.

The committee will meet at the Cooper Union every Tuesday at 1:30 P.M., and the members may be consulted at their respective addresses as below:

J. M. Jones, Chairman, 48 South Oxford St., Brooklyn; Dr. I. P. Trimble, Entomologist, 15 West 31st St., New York; Prof. A. R. Ledoux, 17 Cedar St., New York; Dr. A. S. Heath, Pres. Farmers' Club, 945 Lexington Ave., New York; N. S. Bailey, Secretary, 192 Water Street, New York.

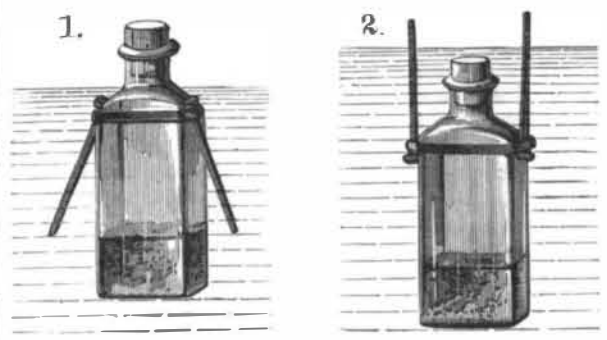
It is desired that all applications be made by August 10, that ample space may be secured. The exposition opens Oct. 5, and closes Dec. 31, 1881.

A LIFE-SAVING LESSON IN PHYSICS.

It is a well-known fact that any person of average structure and lung capacity will float securely in water if care is taken to keep the hands and arms submerged and the lungs full of air. Yet in most cases people who are not swimmers immediately raise their hands above their head and scream the moment they find themselves in deep water. The folly of such action can be impressively illustrated by means of a half empty bottle and a couple of nails; and the experiment should be repeated in every household until all the members—particularly the women and children—realize that the only chance for safety in deep water lies in keeping the hands under and the mouth shut.

Any short-necked, square-shouldered bottle will answer, and the nails can be easily kept in place by a rubber band or a string. First ballast the bottle with sand, so that it will just float with the nails pointing downward, as shown in Fig. 1; then by turning the arms upward, as shown in Fig. 2, the bottle will be either forced under water at once or will be tipped over so that the water will pour into the open mouth, and down it will go. To children the experiment is a very impressive one and the moral of it is easily understood.

The vital value of this precaution was strikingly illustrated near Accomac C. H., Virginia, a few days ago. A niece of the Hon. John Neely, while bathing, was swept off into the ocean by a strong current and soon disappeared in the high breakers. As she could not swim her companions gave her up for lost. Two young fishermen who were employed some distance away thoughtfully set out with a small boat in search of her, and, when a mile or more from shore,



found her floating on the water. She had been drifting nearly an hour and was greatly exhausted, but soon recovered. Unable to swim she had pluckily floated, thereby making her rescue possible.

A Cheap Binding for the Scientific American.

A correspondent says:

I have bound about twenty volumes in this way: Pack the papers smoothly; hold firmly, and drive a thin chisel through the pile about half an inch from the back. Push strong tape through and leave out about two inches; put three or four tapes through at even intervals. Cut common thick paper boards large enough to project a little everywhere except that one edge must come front of the tapes. Draw the tapes tightly and *glue* down to the boards outside. Skive a piece of leather—common sheepskin will answer—wide enough to cover the back and come on the boards an inch or two, and long enough to project a couple of inches at the end. Paste the leather well, put it on the back; fold the ends in so as to come over the boards on each side. Paste any fancy or plain paper over the sides; and, lastly, paste the blank leaf down to the cover inside, and you have a very presentable book and very durable. Trimming the edges is not very essential, as the SCIENTIFIC AMERICAN is now trimmed, but that can be done by clamping between boards, and cutting the edges with a thin sharp knife by a straight edge Of course this is done before the boards are put on after the tapes are in. This makes a flat edge book, but for a thin book answers very well. S. H. B.