ing of the center shaft, *D*. From the annular trough the water flows through a number of vertical pipes, *N*, into the collecting basin, *M*, from which it is conducted by an outflow pipe.

The great capacity of this machine, both for cooling and humidifying, is due to the large amount of evaporating surface provided in the nest of cylinders, combined with the large volume of air which is drawn through the cylinders by the fan. The air, with its temperature raised or lowered and its humidity increased or decreased, passes out into the room through the annular opening between the cylinder and the collecting basin, as indicated by the arrow.

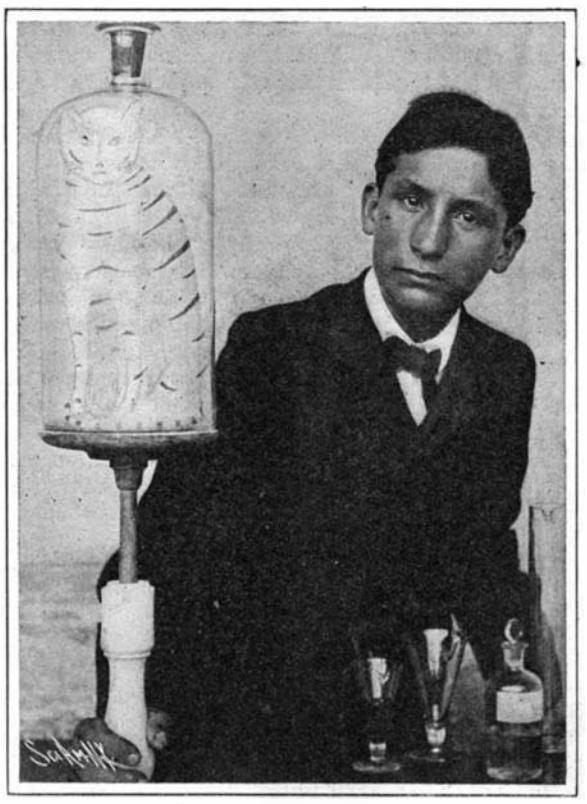
The accompanying table gives the results of an hour and fifteen minutes' test conducted for a representative of this paper, with the 24-inch machine, which forms the subject of one of the engravings. The test was conducted in a machine shop containing 105,000 cubic feet of air. The generator is suspended from the roof by rods, which pass through the base. The fan is driven by a motor which will be seen mounted upon the base, from the bottom of which will be seen the water discharge pipe, which leads down to connect with one or other of two adjoining water tanks. Connecting with each of the tanks is a series of feed pipes, provided with the necessary valves, etc., and leading to a three-throw circulating pump, which will be seen adjoining the tanks. The connections are so arranged that the water may be drawn from one tank, forced over the cooling surfaces of the machine, and discharged into the other tank, or *vice versa*. There are also steam pipe connections, by which the water in the tanks may be raised to the desired degree of temperature.

TEST OF 24-INCH AIR REGENERATOR.

Time.	Thermometer in Room.		Relative Humidity	Water.		Air Delivered by Machine.		
	Dry.	Wet.		Feed.	Return.	Dry.	Wet.	Relative Humidity
	Deg.	Deg.	Per Cent.	Deg.	Deg.	Deg.	Deg.	Per Cent.
12.25	78	67	57	105	93	87	82	80
12.40	79	72	72	110	96	87	82	80
1.10	81	75	75	110	96	88	85	88
1.10	81	75	75	67	96	88	85	88
1.25	81	74	72	71	72	77	72	78
1.40	81	73	68	71	72	76	70	74

Although the air regenerator is designed primarily for cooling the air and reducing humidity, its range of application is much wider than its name would indicate. It is capable not only of decreasing the humidity and lowering the temperature in a room, but, if desired, as in the case of a room in a textile factory, it can increase the humidity and raise the temperature. Furthermore, it can be used to increase or decrease the humidity while maintaining the temperature the same. The method of securing these results is as follows: When it is predetermined to increase the humidity and raise the temperature, the water in the feed tank is heated by steam to a certain desired temperature. This hot water is fed to the machine and distributed over the evaporating surface, where its heat and vapor are imparted to the air, as the latter is drawn through. Conversely, when it is desired to decrease the humidity of a room and lower the temperature, the flow of water is reversed, the cold tank being used as the feed and the hot tank as the return. The resultant effect upon the air is that its moisture is condensed on the cold water which is flowing over the plates, and its temperature lowered.

At the beginning of the test of one hour and fifteeen minutes, above referred to, the dry-bulb thermometer, placed about 50 feet distant from the machine, showed a temperature inside the room of 78 deg.; the relative humidity was 57 per cent; and the outside temperature was 81 deg. As the first half of the test was designed to increase the temperature and humidity, the feed water had been raised by means of a steam jet to 105 deg. The air was taken in from the outside of the building at a temperature of 81 deg., and drawn over the evaporating surfaces. The test started at 12:25, and forty-five minutes later the dry thermometer inside the room showed 81 deg., and the relative humidity had risen to 75 per cent. At 1:10 the operation of the machine was reversed, and the process of cooling and reduction of humidity commenced, the



A CHEMICAL TRICK.

feed water being passed into the machine at 67 deg., and the feed of air being drawn from the interior of the building. Half an hour later, the temperature inside was 81 deg., the relative humidity had fallen to 68 deg., the outside temperature at the time being 82 deg., and the relative humidity of the outside air being 74 per cent.

It should be mentioned in conclusion that inlet air ducts are provided in each regenerator, by which the air may be fed either directly from the atmosphere or taken from the upper strata of air in the room itself. The manipulation of these air dampers, the control of the temperature of the feed water, and the further control of the speed of the fan, render it possible to secure a very delicate regulation of the interior atmosphere of any room in which they are installed. Furthermore, the introduction of large volumes of pure air from the outside, its passage over running water where the dust is caught and removed, and its thorough circulation through the room or building, is in itself a potent safeguard to the health of the inmates.

The American Society of Civil Engineers has admitted a woman to membership in one of its lower grades.

A CHEMICAL TRICK.

BY GUSTAVE MICHAUD, D.SC.

When we happen to witness a phenomenon which seems to violate natural laws, we are not likely to forget its cause if it be explained to us. The following experiment, which I devised for my students, helped them to understand as well as to remember some chemical data.

A white cat, made of flexible pasteboard and imprisoned in a glass jar, is shown to the audience. The lecturer announces that, without opening the jar or even touching it, he will cause the cat to undergo a zoological as well as a chemical transformation. He takes the support of the jar, and pushes it forward in full view of the students. The change occurs almost instantaneously. The cat takes a rich orange color on which black transversal stripes rapidly paint themselves. The cat has become a tiger.

The whole transformation is produced by emanations of hydrogen sulphide, which is generated in the jar itself without any visible apparatus. The cat has been previously coated with a solution of chloride of antimony wherever the orange hue was to be produced, and with a solution of basic acetate of lead wherever the black stripes were to appear. Both solutions are colorless. After the coated cat has been introduced in his glass cage, a small piece of pasteboard is placed under the wooden support so as slightly to incline the jar forward. A few decigrammes of pulverized sulphide of iron folded in a piece of blotting paper are deposited behind the cat, on the elevated side of the bottom of the jar. Two or three cubic centimeters of diluted sulphuric acid are dropped with a pipette on the opposite side. When the performer wishes the transformation to take place, he takes the wooden support and pushes it forward as if he wanted to enable everybody to see better what is going to happen. By so doing he suppresses the slight inclination which kept the iron sulphide beyond the reach of the sulphuric acid. The gas is evolved, and the formation of the orange sulphide of antimony and black sulphide of lead takes place in a few seconds.

THE ART OF INVENTING.

BY EDWIN J. PRINDLE, OF THE NEW YORK BAR.

It seems to be popularly believed that the inventor must be born to his work, and that such people are born only occasionally. This is true, to a certain extent, but I am convinced there are many people who, without suspecting it, have latent inventive abilities, which could be put to work if they only knew how to go about it. The large percentage of inventors in this country compared with all other countries, shows that the inventive faculty is one which can be cultivated to some extent. The difference in ingenuity is not wholly a matter of race, for substantially the same blood exists in some other countries, but it is the encouragement of our patent laws that has stimulated the cultivation of this faculty.

The popular idea seems to be that an invention is produced by its inventor at a single effort of the imagination. It is, undoubtedly, true that every inventor must have some imagination or creative faculty, but, as I shall seek to show, this faculty may be greatly assisted by method. While reasoning does not constitute the whole of an inventive act, it can, so to speak, clear the way and render the inventive act easier of accomplishment.

In the making of all inventions which do not consist in the discovery of the adaptability of some means to an end not intentionally being sought after, the first step is the selection of a problem. The inventor should first make certain that the problem is based upon a real need. Much time and money is sometimes spent in an effort to invent something that is not really needed. What already exists is good enough or is so good that no additional cost or complication would justify anything better. The new invention might be objec-

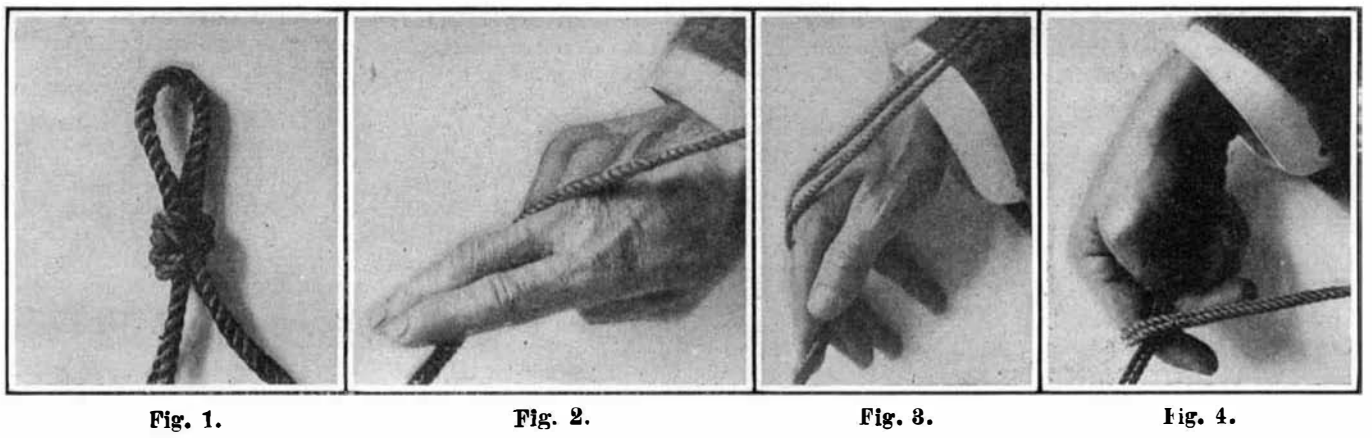


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

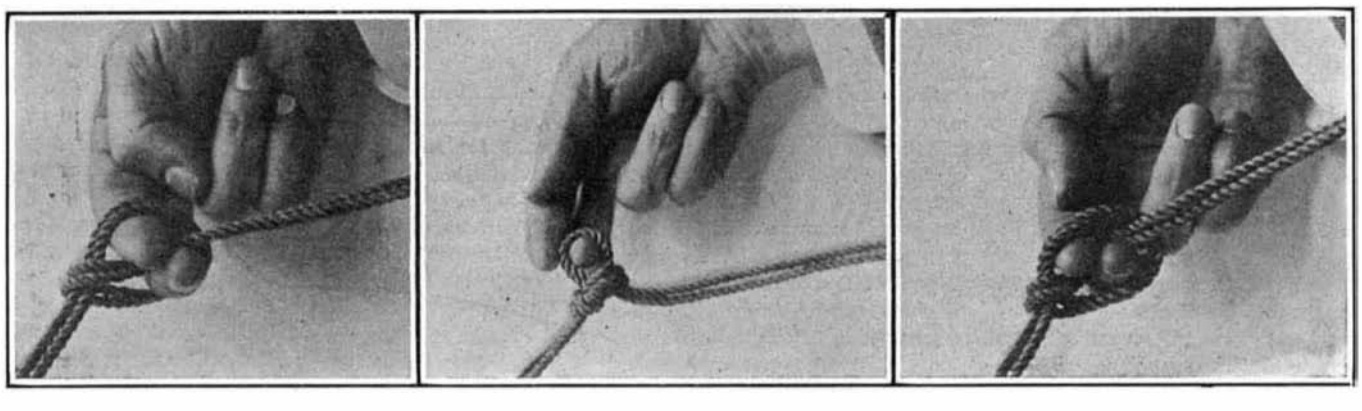


Fig. 5. Fig. 7. Fig. 6.

HOW THE CORD KNOTTER OF THE SELF-BINDING HARVESTER WAS INVENTED.