PRACTICAL MECHANISM.

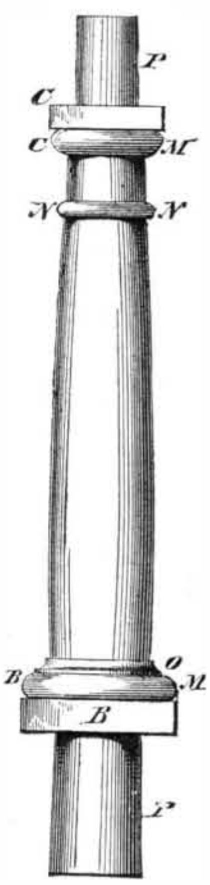
BY JOSHUA ROSE.

NEW SERIES—No. XXIV.

PATTERN MAKING.—BENCH WORK.

Round columns are either plain, fluted, or of a mixed design to agree with the square columns in the same building. Fig. 180 represents a plain round column; but it must be remembered that, even though the shaft be plain, the design of the base and cap may be modified according to taste. In the case of so simple a one as we have illustrated, it would probably be cast solid as represented; though if of very large size, as those in the crypts of churches, perhaps 18 inches in diameter, a great deal of metal would be saved by simply casting a plain round shaft with the mouldings, N and O, upon it, and of a length measured from the lower part of the base to the top of the cap. This casting takes the weight of the building. The base, B, with its moulding, B M, and the cap, C, with its moulding, C M, are thin castings fixed to

Fig. 180.



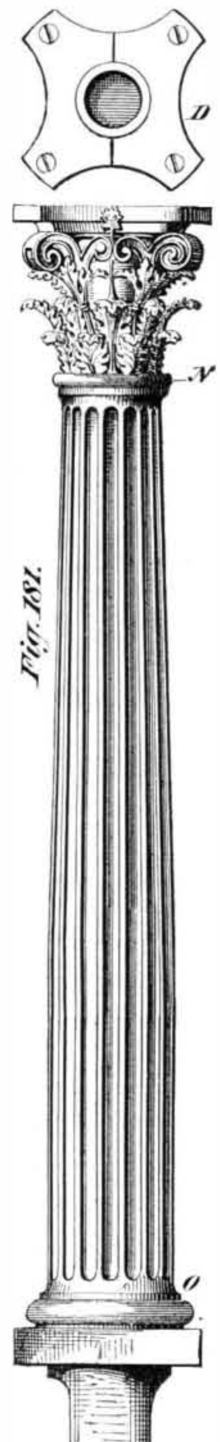
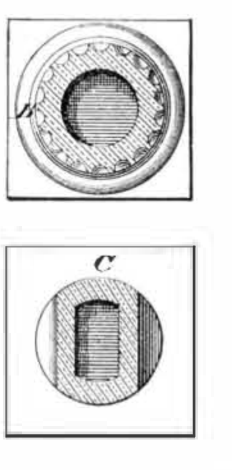


Fig. 181.

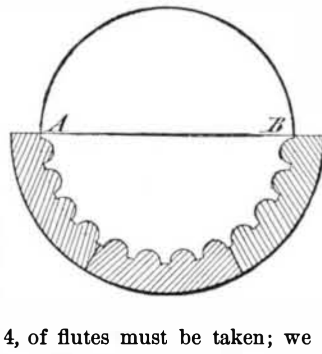
Fig. 182.



the column by screws. P P are the core prints. Little need be said as to the method of preparing a pattern of this description. If small, it will be turned from the solid wood; and if large, it will be lagged or staved up, as we have described on page 101 of our current volume. In any case, the pattern must be made in halves. Some foundries require a half-core box; while in others, the core is struck up in the manner described on page 229, volume XXXV. We may now pass to the consideration of the fluted column shown in Fig. 181. D is a plan of the peculiar cap required for this kind of column; it is neither square nor round, but of a shape which harmonizes beautifully with the carved work below, all of which, including the cap, is added afterwards, the column being cast a plain round above the member marked N, and also below that marked O. The extension, A, is the part which passes between the joists of the flooring; it is often flattened to admit of this, as shown at C, Fig. 182. B is a section of the column through the fluted part. It is not thought necessary to show the prints, as they would be similar to those shown in Fig. 180, the lower one being flattened if the extension, A, were required.

We have now arrived at the most important part of this branch of our subject, and that is, how to make the fluted pattern column so that it may be extracted with facility from the mould; for, by referring to Fig. 181, it will be seen that the rammed sand, by entering the flutes, would lock the pattern down unless this difficulty were provided for. To overcome this difficulty, we refer the reader to Figs. 183, 184, 185. Fig. 183 is a sectional view of a column, turned extra large at the part intended to be fluted so as to form a plain core print all around the column. A convenient number, divisible by 3 or 4, of flutes must be taken; we have taken 12 flutes in the half column. A suitable core box must be constructed with, say, four flutes; these cores, when packed around the mould, will core out the flutes in the column. This method is only given because there may be special cases where it would be most suitable; but it is not that generally adopted.

Fig. 183.



In Fig. 184, each half of the column is formed of three pieces, which are held together by taper dovetails; in this case the middle piece is first drawn from the mould and then the side pieces. This method will accommodate any even number of flutes, and is quite practicable; the objection to it, however, is that the dovetails are liable to stick, and also that, when the middle piece is drawn out, the side pieces sometimes fall into the mould, to its irretrievable injury.

Fig. 184.

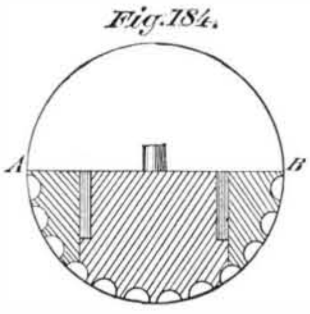
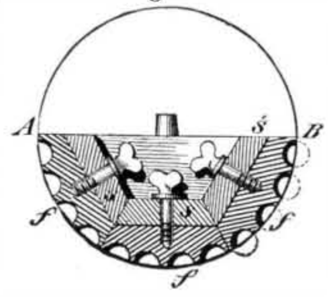


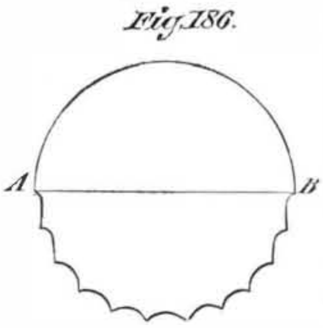
Fig. 185 represents the arrangement in most general use; it is not nearly so expensive as that shown in Fig. 183, nor is it open to the objections mentioned in connection with Fig. 184. The three pieces marked S are the main staves of the column pattern, but the number is not arbitrary. We may take four or any other number, depending on the size of the column; it is advisable, however, to have as few pieces as possible. What we have to do is to notice the direction taken by the pieces as they are drawn out, and if it appears that the flutes do not escape properly, then a larger number of divisions must be made. The pieces marked *f* are the supplementary staves in which the flutes are cut; they are attached to the inner staves by screws, which are removed by the moulder, who is then able to extract the pattern. The side pieces, *f f*, are then drawn out, and lastly the lower pieces, the process being, it will be noticed, the reverse of that shown in Fig. 183. In each case, the line, A B, is the parting line of the pattern, which must always occur in the middle of a ridge and not in a flute. The flutes should be cut out to a half circle, and eased off slightly towards the ridges with sand paper. They must not be in the least undercut, because of the draft in the mould. The pattern should be made as smooth as possible by alternately sand-papering and varnishing, using well worn sand paper to insure smoothness.

Fig. 185.



In Fig. 186 are shown what are called bastard flutes. Their use gives a cheap but not beautiful style, and they are sometimes employed on lamp posts and columns in the cheaper class of tenement houses. The flutes, it will be noted, are made shallow and of a shape to permit the whole half pattern to be removed from the sand. The flutes are cut out of the solid, the front ones being the deepest and the side ones so shallow that many of them are scarcely distinguishable.

Fig. 186.



In columns whose designs are of a mixed character, the methods illustrated for fluting are equally suitable for cableing, as shown in Fig. 185, where the cableing is shown in dotted lines; while rosettes, rope mouldings, and the like, are either attached by wires, as shown in the illustration of square columns, or they must be cast separately and afterwards affixed by screws, as are many other ornaments whose shapes preclude their being moulded solid with the columns.

Diamond Cutting by Girls.

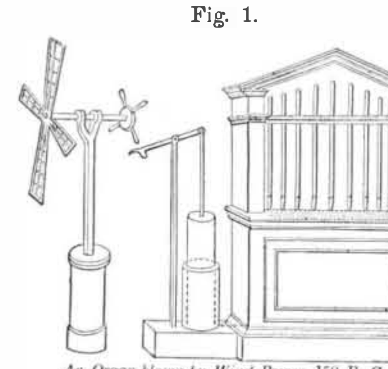
Messrs. H. Cohenno & Co., of New York city and Boston, Mass., write to say that the Dutch Israelites have never refused to instruct American boys, but have consented to do so if paid a proper remuneration, such as they themselves had to incur to learn the business; and further, Mr. Morse's men were not discharged, but left voluntarily. They also say that they are not able to discover where Mr. Morse's girls are at work.

ORGANS, OLD AND NEW.

In the organ the notes are produced by pipes of different lengths, shapes, and materials, supplied with air by bellows and operated by keys which admit or cut off the supply.

The dimension of the instrument is designated by the number of feet of length that its largest pipe measures, forming the lowest note of the key board. Thus we speak of an organ of 32, 16, or 8 feet. An instrument which possesses open flutes of 32, 16, 8, and 4 feet, and a principal an octave above the latter, has a compass of 8 octaves. Large organs sometimes have five key boards, one above another. The first, nearest to the organist, is that of the choir organ. The second, that of the great organ. The third, the swell key board. The fourth, the recitative key board. The fifth, the echo key board. Below these is the pedal key board, played by the feet. The music of the organ is sometimes written on three lines, the two upper ones for the hands and the under one for the pedal key board.

Fig. 1.



An Organ blown by Wind-Power, 150 B. C.

In the "Spiritalia" of Hero of Alexandria, who flourished 150 B.C., we find a description of an organ blown by the agency of a windmill which works the piston of the air pump. Its invention is, perhaps, to be credited to Ctesibus of Alexandria, though it is likely that it was the result of the gradual improvement by various parties through the centuries. The reconstruction of it, given in Fig. 1, is taken, with other engravings presented, from Knight's "New Mechanical Dictionary."* The descriptions of it by Athenæus, Vitruvius, and Claudian render it certain that the pipes were musical, and blown by the force of water, instead of expansible air bellows.

Fig. 2.

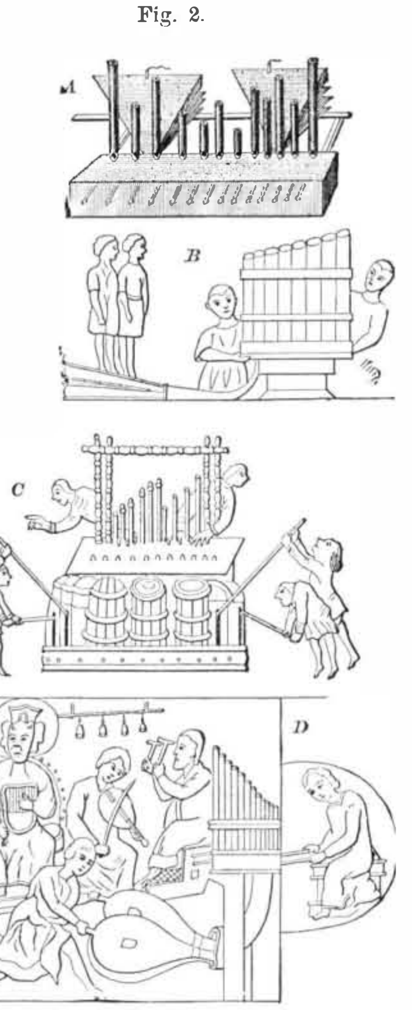


Fig. 2 shows several old methods adopted for supplying wind to the organ; the arrangement of the keys and the manner of manipulating them are also illustrated.

A is a representation by Father Kircher of a very primitive form of Hebrew organ, the "Macraphe d'Aruchin." In this, as in other of the earlier organs, a leathern bag served the purpose of the wind chest.

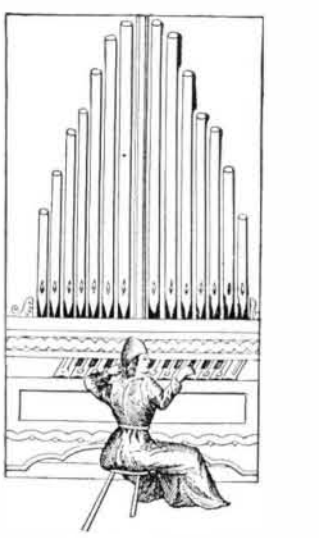
B is copied from the sculptures on an obelisk at Constantinople, erected by Theodosius, who died A. D. 395.

C is a pneumatic organ of the tenth century; it is taken from an ancient psalter in the library of Trinity College, Cambridge.

* Published in numbers by Messrs. Hurd & Houghton, New York city.

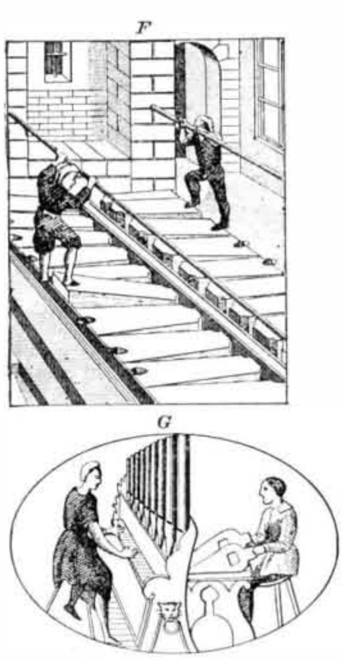
D, from Gori's "Thesaurus Diptychorum," is said to have been taken from a manuscript of the time of Charlemagne. It represents King David seated on his throne, his scepter in one hand and a lyre in the other, on which he appears to be playing, accompanied by several instruments, including the organ.

Fig. 3.



Old-Time Organs.

Fig. 4.



Old-Time Organs.

Fig. 3 is from an engraving in the "Theorca Musica" of Franchinus Gaffurius, printed at Milan, 1492.

F. Fig. 4, shows the ancient method of blowing. On each bellows is fixed a wooden shoe; the men who work them hold on to a horizontal bar, and, inserting their feet into a pair of the shoes, alternately raise one and depress the other.

G is what was formerly known as the "positive," in contradistinction to the "portative" organ. The latter, as its name implies, was portable, being carried in processions by one person and played by another; it was also called the "regal" or "rigol." The former was fixed in position, and, when carried in a procession, it and its stand were placed on a car. An organ of this kind was afterwards placed before the great organ in churches, the two constituting a single instrument, the "positive" being the origin of what has since been designated the choir organ.

The devices required in order to make a pipe sound or speak are: the bellows for supplying condensed air; a channel for conducting it to the pipe; a valve or other contrivance for admitting and cutting it off; and and a lever for opening and closing the valve.

The pipes are of two descriptions: the mouth or flute pipe (technically called flue pipe) and the reed pipe, which are each further divided into several varieties. Mouth pipes, so-called from having a mouth and lips similar to those of the flageolet, are either of wood or metal. The latter are those observable at the front of the organ case, and are cylindrical in cross section. The wooden pipes are rectangular in section, the sides being in the proportion of 5 to 4; the interior is usually sized with glue. The upper end is open, or is closed by a tompion made airtight by a leather covering. The other end is closed by a block to which three of the sides are glued, a narrow aperture being formed between the block and the front side, by beveling this side so as to have its sharp edge on the interior; this is called the upper lip or windcutter. Another block is arranged so as to leave a narrow space between it and the block. The hollow cylinder, through which air from the bellows is supplied, is let into this block. A mahogany cap, hollowed out on the inner side so as to leave the aperture free, is fastened to the front of the pipe below the mouth. The aperture between the cap and the block, called the plate of wind, admits the compressed air from the bellows in a thin stream, which, being forced against the mouthpiece or windcutter, produces a musical note determined in pitch by the length of the column of air set in motion. In order to voice the pipe—that is, improve the tone—the edge of the block opposite the upper lip is slightly pared away and serrated so as to divide the plate of wind and direct it against the inner edge of the lip. The pitch of a note depends on the length of the pipe, while the tone or timbre depends on its diameter, its shape, or on the kind of wood employed; that yielded by pipes of hard woods, as mahogany, being more clear, while the softer woods yield a mellower sound.

The chimney-top pipe has a small open tube in the top plate for the purpose of sharpening a note: a similar effect is sometimes produced by a hole in the tompion. Metallic mouthpipes are made conical at their lower termination, and where this cone and the cylindrical portion unite is an aperture occupied by a thick plate of soft metal, called the languette, nearly closing the tube, but leaving a small opening for the wind plate, formed with the upper lip.

The thickness of the stream of air admitted to the pipe may be diminished by turning down a projecting exterior lip on the plate. The reed pipe is closed near the bottom by a solid plug, having apertures for the passage of the reed and its adjusting wire. The reed is a cylindrical or slightly tapering tube of brass, having a narrow longitudinal slit in front, covered by a thin plate of metal called the tongue, which is made fast to the reed at its upper part, but is free at the lower end. The back part of the reed is cut off slanting at its lower termination, over which a piece of metal is soldered. The pitch of the reed pipe depends on the length of the tongue, which is adjusted by means of the tuning wire above mentioned; the quality of tone depends on the pipe.

A stop consists of a series of pipes agreeing in quality of tone, or timbre, but differing in pitch. When any particular stop is drawn the keys will play on the corresponding set of pipes. The stops are designated by figures or by words intended to be descriptive of the quality of sound, as *flute*, *oboe*, *vox humana*, etc.

Two or more key boards are required to enable the performer to produce all the notes in an organ of more than one stop. In a large organ the different series of stops are so arranged as to form three or four separate instruments, each having its own set of keys, wind trunk, wind chest, sound board, etc. These have been distinguished by different names, as the great organ, the choir organ, and the swell; also the pedal organ or foot keys which act on the larger pipes.

Couplers are also brought into action at will, which connect the keys on different banks so as to make them act together when one is played. The effects are also varied by tremolo and swell, which give respectively quavering and rising and falling force of sound. The feet of the pipes are inserted in the upper or stock boards, above the bearers and supported on racks—thin boards mounted on pillars. The pipes of the larger stops, however, take up so much space that they cannot be placed immediately over their proper groove, but they may be placed in any convenient position, even outside of the case, and air conveyed to them by means of grooves cut in the upper boards and covered with parchment, forming closed channels.

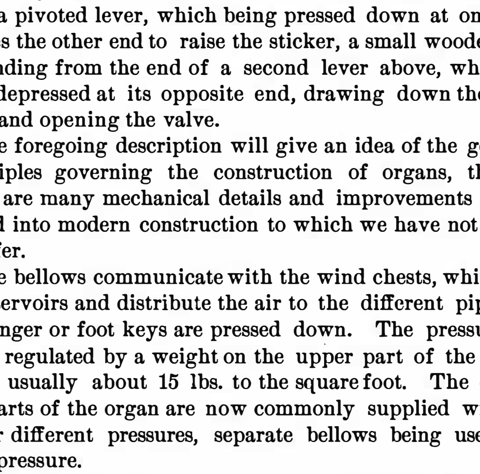
The key movement, in its simplest form, comprises: the key, a pivoted lever, which being pressed down at one end causes the other end to raise the sticker, a small wooden rod depending from the end of a second lever above, which is thus depressed at its opposite end, drawing down the pull wire and opening the valve.

The foregoing description will give an idea of the general principles governing the construction of organs, though there are many mechanical details and improvements introduced into modern construction to which we have not space to refer.

The bellows communicate with the wind chests, which act as reservoirs and distribute the air to the different pipes, as the finger or foot keys are pressed down. The pressure of air is regulated by a weight on the upper part of the reservoir, usually about 15 lbs. to the square foot. The different parts of the organ are now commonly supplied with air under different pressures, separate bellows being used for each pressure.

The wind chest is an airtight box communicating above with the sound board, an oblong frame or box of wood divided by parallel strips into channels or compartments completely separated from each other. Holes corresponding with the number of ranks of pipes are bored through the upper part of the sound board into each channel. Its lower side is covered with parchment or leather, except on that part where the channels communicate with the wind chest and are closed by clack valves opened by means of pull-down wires operated by lever connection with the keys and brought back by a spring. On the upper side of the sound board, at right angles to these channels, a set of grooves, corresponding in number to the number of stops, is formed by screwing down thin pieces of hard wood, termed bearers. These communicate through holes with each of the channels below, and each has a register or slide, a little thinner than

Fig. 5.



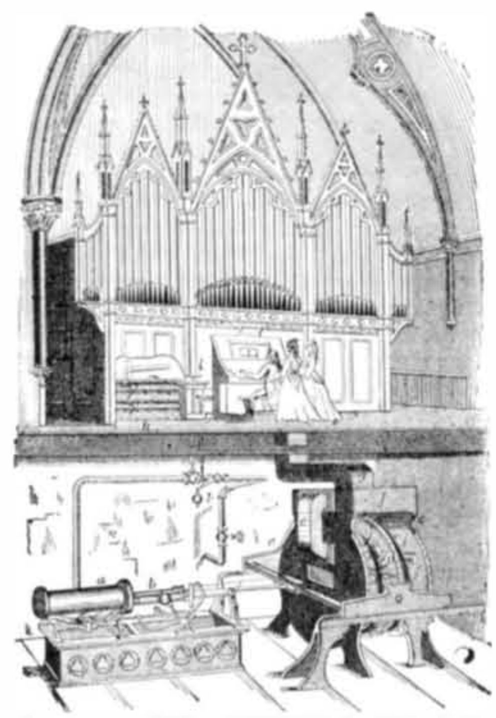
Blowing-Engine for the Organ Royal Albert, Hall of Art and Sciences, South Kensington, London.

the bearers, but exactly fitting the groove in length and width. The slides are pierced with holes corresponding in number and size with those of the sound board, so that, by drawing out or pushing in any particular slide, it is caused to open or close the holes in the sound board, and supply or cut off the air from the range of pipes above it.

In organs of the largest class as formerly constructed the operation of the keys was a work requiring, in addition to musical skill, a large amount of hard bodily labor. It is said that the performer on the great Haarlem organ was obliged to strip preparatory to commencing his work, and retired covered with perspiration at the end of the hour's performance. This is one of the largest instruments in Europe, having 60 stops and 8,000 pipes. One at Seville has 5,300 pipes. The expenditure of wind varying greatly, according to the series of notes produced, the tension of the air supply was very different at different times, causing a variation in the purity of the tone and difficulty in opening the valves when under high pressure. These difficulties were remedied by the pneumatic lever of Barker, in which small subsidiary bellows operated by the movement of the key are employed to depress the wires by which the valves are opened.

Where an extraordinary large supply of air is required, it may be furnished by blowers or bellows operated by hydraulic or steam power. Fig. 5 illustrates the blowing engine employed for the great organ at the Albert Hall, South Kensington, London, England. It is a vertical beam engine having two steam cylinders of 7 inches diameter and 24

Fig. 6.



Lascell's Organ-Blowing Apparatus (Dr. Partridge's Church, Brooklyn, N. Y.).

inches stroke, and two blowing cylinders of 24 inches diameter and 24 inches stroke. Its principal duty is to compress and attenuate air for blowing and for mechanical purposes, such as opening and closing the stops. The valves of the blowing cylinder are of india rubber. The upward stroke exhausts the air from vacuum receivers, to which it is connected by zinc piping, and the down stroke exhausts the pressure receivers to which it is similarly connected. In addition to the ordinary governor, it has two throttle valves connected respectively with the pressure and vacuum receivers: so that when the former is filled with air at 1½ lbs. pressure above, and the latter with air at 1½ lbs. pressure below, that of the atmosphere, both throttles are closed and the engine stops, thus regulating the supply according to the ever-varying requirements of the organ.

A horizontal engine of 13 horse power, driving a crank to which six large bellows are connected, furnishes compressed air to the reservoirs which supply the pipes.

The giant organ is 60 feet wide and 70 feet high; the four center pipes, which are over 40 feet long, weighing nearly a ton each. The instrument was erected by Mr. H. Willis, and, according to the *English Mechanic*, is the finest in the world, having five claviers (four manuals, extending from C C to C in altissimo, and one pedal from C C C to G). The pedal organ consists of 21 stops; the first manual clavier, or choir organ, including the echo organ, comprises 20 stops, all the pipes in which are of metal. The second clavier, or great organ, contains 25 stops, only two of which have wooden pipes in the bass notes. The third clavier, or swell organ, comprises 25 stops, and these are all, with the exception of the basses of two stops, of metal. The fourth clavier, or solo organ, has 20 stops, making in all 111 stops; then there are 14 couplers and 32 combinations. The total number of pipes is close upon 9,000, and these range from 30 inches diameter down to the size of a straw, and from 40 feet in length down to 6 inches.

Fig. 6 illustrates an organ provided with the hydraulic blowing apparatus designed by G. W. Lascell, Brooklyn, N. Y.; *a* is the cylinder, the piston rod of which *b* is attached to the crosshead of a reciprocating frame, *c*, by which the movable diaphragm, *d*, of the double-acting bellows is operated, alternately forcing the air through the pipes, *e*, *e*, into the wind chest, *f*, from which it is distributed by the trunk, *g*, to the organ bellows, *h*. The wheel, *i*, is connected with a wire that controls the lever, *k*, of the governing valve of the water supply pipe. As the bellows, *h*, becomes inflated, the block on its upper lid strikes against the lever, *m*, closing partially or entirely the valve, and automatically regulating the supply of air to the demand. By means of a hand wheel, *i*, which can be conveniently reached by the organist, a valve, *k*, is opened or closed for admitting or cutting off the water supply. In this engine the crank is dispensed with, and the valve gear so arranged as to prevent stoppage on the dead centers.

Communications.

Danger of Galvanized Cooking Utensils, Water Pipes, Etc.

To the Editor of the Scientific American:

I notice in your issue of March 31 an item from the *Deutsche Industrie Zeitung* on the deleterious effects of zinc oxide in toys, etc., and from the remarks preceding judge that you agree with what follows. I have always in the practice of my profession (analytical chemistry) strongly deprecated the use of galvanized articles, water pipes, culinary utensils, tanks, etc.; but am well aware that this is a point on which the doctors disagree. I would like exceedingly to have the matter argued, in your excellent paper, by disinterested parties, for I have somewhat myself to say on the subject.

I know that the water boards of certain cities hold certificates from practical chemists to the effect that galvanized pipe is harmless and the best for general use, and that citizens are advised to employ it. I consider the use of zinc-coated pipes or vessels for culinary purposes both filthy and dangerous to the public health, whether they are used cautiously and intelligently, or rashly, like the farmer who purposed to boil down cider and sour apples in a galvanized tank.

In large houses, where there are great lengths of galvanized piping, much zinc goes into the systems of the inmates, producing more or less ill health and discomfort; I have heard complaints of milky drinking water on the breakfast table, etc., proving that the servants draw water for use directly from the pipes without allowing any to run to waste.

That zinc-lined pipes contaminate water flowing through them for very long periods is plain from the following: The water for my hothouses flows through 190 feet of inch galvanized pipe from the street main; the water is from Wenham Lake and proverbially pure; the pipe has been in position and daily use for seven years; even now the first water drawn from this pipe in the morning is quite opalescent from hydrated oxide of zinc. I would be loth to drink such water; and believing that what is unfit for animals' use from metallic contamination cannot benefit plants, I have given directions that at least ten gallons shall run to waste before the water is used. Such precautions are rare in dwelling houses, I am sorry to say.

If we can have this matter discussed in your journal, and perhaps settled one way or the other, much good may accrue. I feel convinced that zinc misused is doing great mischief to public health. DAVID M. BALCH.

Salem, Mass., March, 1877.

[We shall be pleased to receive such information as any of our readers may have to offer on this subject. But we are inclined to think that there is not room for lengthened argument as to whether galvanized pipes are or are not a safe and desirable medium for the conveyance of drinking water. They are unquestionably dangerous; and if further evidence than that above offered by our esteemed correspondent is desired, it can readily be had by consulting the back numbers of the SCIENTIFIC AMERICAN. In fact, in our present number, under the head of Answers to Correspondents, in the correction of a reply given to W. D., we republish a few facts bearing upon the matter.—EDS.]

A Woman's Success with Bees.

To the Editor of the Scientific American:

I am a reader of the SCIENTIFIC AMERICAN, from which I obtain much valuable information. I am wintering fifty swarms of bees on their summer stands, some of them being nearly buried in snow. They are doing finely. I have of my own a system of management entirely original. My hives are so constructed and arranged that I have the swarming propensities of bees as completely under my control as does the stock raiser an increase of his cattle, sheep, or swine. I have no increase by bees swarming unless I desire it; I turn the whole force of bees to storing honey in the boxes connected with the hive. Ample room is given in the boxes for storing honey, so that the bees will fill thirty boxes as quickly as they would three in an ordinary hive. The boxes are so easy of access that the bees enter and commence work without the least hesitation. When I want an increase of swarms, I do not divide or make artificial swarms. But after a close study of the habits and instincts of bees, I am able to have them swarm out naturally, at any designated date in the swarming season, which I may arrange in early spring. My bees average me a clear profit of over fifty dollars a year for each hive I keep, by sale of surplus honey in glass boxes. I am satisfied that bee-keeping is profitable, even in our cold New England climate, where the honey season is short.

I have the Italian bees, and find them greatly superior to the common bee in many points. They will collect double the amount of honey in the same locality. Their vigor in withstanding our cold climate is a strong point in their favor. They also resolutely protect themselves from the ravages of the bee moth, while the common bee often falls a prey to its ravages. Then their beautiful color and large size render them objects of admiration. Then they seldom sting, or show any signs of anger. I have furnished several of my friends with full swarms of Italian bees in my hive, and they have in each case been highly pleased with them. My Italians are beauties; nearly the entire body of the bee is a light straw color. If bee keepers would study more closely the habits of bees, the profits would be greatly increased.

West Gorham, Me. L. E. COTTON.

On Color and Disease.

To the Editor of the Scientific American:

There is something in the color of animals, especially of the feet of animals; but I think your correspondent (page 200, current volume) is mistaken in regard to the pigs eating a poisonous plant, which caused their white hoofs to drop off.

During the war I was in the artillery service, and it was a noted fact that a horse's white foot would get sore when others would not. "Scratches," some called it; and at one time every white foot in a battery of 156 horses was sore, and with few exceptions the rest were all well. They did not graze, but only got the regular rations of oats, corn, and hay, sent from the North and West, and could not have eaten any poisonous plants. We attributed the sore feet to standing in wet and mud, making it impossible to keep the hoofs clean during a Virginia winter with the poor facilities at hand. But how it was that the white feet only were affected we never could explain.

Baltimore, Md. FRED. W. WILD.

How Safes are Blown Open.

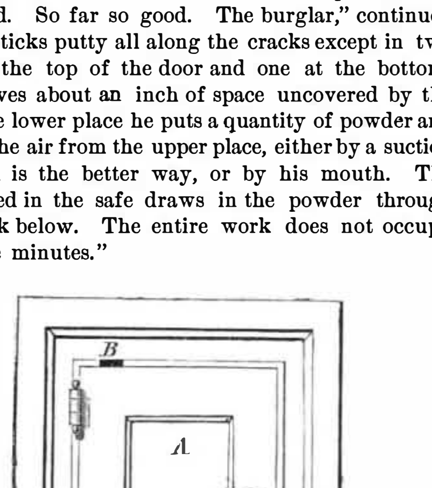
A criminal lately gave to a reporter of the New York *Herald* the following mode of introducing powder within a safe for the purpose of blowing open the doors.

"What tools did you use in drilling the holes?" asked the reporter.

"Good cracksmen don't use tools," answered the burglar. "I'll show you how to blow open any safe in New York without any tools. Just take me to a safe."

There happened to be a safe in Judge Kilbreth's private room, and the writer acquainted the magistrate with the prisoner's proposal. "By all means," said he, "let us learn;" and in a moment the room was filled with spectators.

The prisoner knelt beside the safe, which was locked. "Look," said he, "at this door. Its fits so tightly that no instrument can be introduced in the cracks and powder cannot be inserted. So far so good. The burglar," continued he, "simply sticks putty all along the cracks except in two places, one at the top of the door and one at the bottom, where he leaves about an inch of space uncovered by the putty. At the lower place he puts a quantity of powder and he sucks out the air from the upper place, either by a suction pump, which is the better way, or by his mouth. The vacuum created in the safe draws in the powder through the small crack below. The entire work does not occupy more than five minutes."



The above diagram illustrates the method described. D is the safe door; E E are points left uncovered by the putty. The powder is placed at the lower point, the suction pump at the upper one.

Borax as an Antiseptic.

At a recent meeting of the Pharmaceutical Society, London, Mr. Robottom made some very interesting remarks on the discovery of borax in Southern California, and related a very remarkable and somewhat romantic incident. Traveling on one occasion, weary and unwell, across the bed of what had been at some former period a vast salt lake, and from which some hundreds of tons of native borax are now dug out and obtained, he saw in his pathway the dead body of a horse, and upon it, with but little hesitation, sat himself down to rest. The sun was shining fiercely, and the water he was carrying was hot and unfit to drink. He, however, bathed his temples from the vessel containing it and felt refreshed. Then, with his mind bent on discovery, he commenced a *post mortem* on the body of the horse. To his astonishment, though the temperature around him was almost too high for endurance, he found that no decomposition had taken place, but that, on the contrary, the flesh, as such, was in a perfectly sound and good condition. On inquiry, he was told that the carcase had been lying on the bed of borax, which was immediately underneath it, during the whole of the previous six months. Thereupon Mr. Robottom arrived at the conclusion, and very naturally so, that the borax had been instrumental in preserving the flesh, and in entirely preventing those putrefactive changes which under ordinary circumstances would inevitably have set in. Now if this were really the case, says Mr. W. Willmott, in the *Pharmaceutical Journal*, the discovery would be of much value. "For an account of some excellent experiments, showing the effect of borax on substances readily capable of fermentation and putrefaction, I would refer to a paper by J. B. Schnetzler, inserted in the 'Year Book of Pharmacy' for 1875, page 332. Though, in these experiments, beef, veal, and portions of sheep's brain, were wholly immersed in a concentrated solution of borax, the result was not completely successful. There was no putrefaction, but the meat had an odor *sui generis*. In the case, however, of the dead horse, not only had the borax kept intact the part with which it was immediately in contact, but, inferentially, the whole carcase had been brought successfully under its preservative influence. It is difficult to acquiesce in a conclusion such as this. Borax, in fact, possesses no such power. As an antiseptic it is inferior to boracic acid, whilst boracic acid must yield in turn to carbolic and benzoic acids. And yet meat will putrefy in an atmosphere of the latter though entirely cut off from contact with the outer air. How then, in the present instance, is the preservation of the body of the horse under a burning sun to be accounted for? Presuming the statement of Mr. Robottom's informant to be correct, it would seem to point to the probable truth of the germ theory. It is not impossible that in the wild and untrodden regions of Southern California, beyond and around the Sierra Nevada, the atmosphere, from its extreme and almost optical purity, together with its excessive dryness, causing particles of saline matter from the surface deposits to diffuse themselves through it, might be found incapable of propagating germ life. In an atmosphere such as this, decomposition would be slow, and even the experiments of Dr. Bastian might be reduced to *nil*. But, be this as it may, borax can scarcely exercise its antiseptic power except under the condition of actual contact. If it were otherwise, the grand problem of bringing animal food from the distant shores of Australia would be immediately solved. We might well wish for such a result, and it may be ours in time. In the meanwhile, it is instructive to learn the many and various uses to which borax may be advantageously applied, and at the same time deeply interesting to know that, henceforward, it will come to us in comparative purity, and without stint or limit, direct from the newly discovered saline deposits of the Far West."

Opposition to Machinery.

We are informed, says *Capital and Labor*, that in an eminent coach-building establishment, a short time ago, the principals desired to introduce an American machine for making the wheels. These, of course, have to be prepared and fitted together with the utmost accuracy; and the machine in question secured this so that any number of wheels could be turned out strictly to gauge. Some of the men engaged in this department were ready enough to work the machine, by which their own labor was lightened, and higher wages were secured to them. But as the use of the machine was contrary to the trade union rules, the men were ordered to desist. The machinery was therefore put aside. Since that time wheels made by similar mechanism have been imported from America, this being the only way by which the public requirements for light and strong wheels could be met. It is a curious fact that some of the English carriages exhibited at Philadelphia last year were mounted upon American wheels, which had been sent over from the United States to England, painted, and then returned with the body of the carriages for exhibition. We understand that large numbers of wheels are thus imported, which might have been made in England but for the insensate opposition to the use of machinery.

Cotton and its Spindles.

An eminent cotton firm, in an annual report of the cotton trade during 1875–76, gives the following as the number of spindles in Europe and America, and the average annual consumption of cotton:

	No. of spindles.	Cotton per spindle. lbs.	Annual estimated consumption. lbs.
United States	9,600,000	63	600,000,000
Great Britain	39,000,000	33½	1,297,000,000
France	5,000,000	42	—
Germany	4,650,000	55	—
Russia and Poland	2,500,000	60	—
Switzerland	1,850,000	25	—
Spain	1,750,000	46	—
Austria	1,580,000	67	—
Belgium	800,000	50	—
Italy	800,000	56	—
Sweden and Norway	300,000	65	—
Holland	230,000	60	—
Total spindles	68,060,000		2,906,000,000

or upwards of 6,000,000 bales of the average weight of an American bale.

Ring Sickness.

This is not dissimilar from sea sickness; it requires long experience in a ring to overcome the nausea consequent upon going round and round in one direction. One of the most difficult things for a circus rider to overcome is this sickness. Clowns and ringmasters suffer from it greatly, at first, from merely seeing the horses go round and round; but even after years of experience, a ringmaster (whose principal business in the ring is to keep the horses up to a certain gait, and not merely to give cues to the clown), if a horse balks or gets behind time, and he is obliged to keep close upon him, is very likely to suffer from a pronounced fit of sickness at the stomach after he leaves the ring.