Why Patents are Necessary.

Henry M. Smith, in his address on "Farmers and Patents," says: "The number of patents granted annually is 15,000 to 16,000, and nearly half as many more were rejected last year. Since the adoption of the plan of examination, the number of rejections has been about one-third of the whole number of applications. This weeding out gives a value to the American patentwhich no patent issued on any other system can possess. It is this assured value of novelty that gives the American patent system its strength, and its value to the inventor, and hence to the public. The whole public is interested in the growth of material resources, and must be directly interested that the inventor shall be stimulated by a hope of reward, and that his expectancy be so well assured that it can be parted with and assigned to some one who can furnish the means to carry the invention to success.

"Tenfold more inventive skill is now called for than could have possibly found employment in a simpler age. Discovery is being pushed in directions only now for the first time possible. It is found in the history of inventions that inventions come in separate eras. The era of agricultural machinery is not old. It begins first with any solid meaning in 1850, yet what has it wrought! To-day the farmer can more easily feed 100 men than his grandfather could, with the old farm appliances, feed his household. It is shown by the recent census that we have 3,500,000 agricultural laborers in a total of about 17,500,000 workers of all classes, yet we export $288,000,000 worth of breadstuffs, or more than three times the amount of export per agricultural laborers ten years before. Agricultural machinery has been supplemented in advantages to the farmers at a multitude of points in the patent list.

"We need new inventions to meet a multitude of demands for the commonest processes and utilities. It is not the time to say now we have enough. When the steam engine itself, after one hundred years, is still so far short of

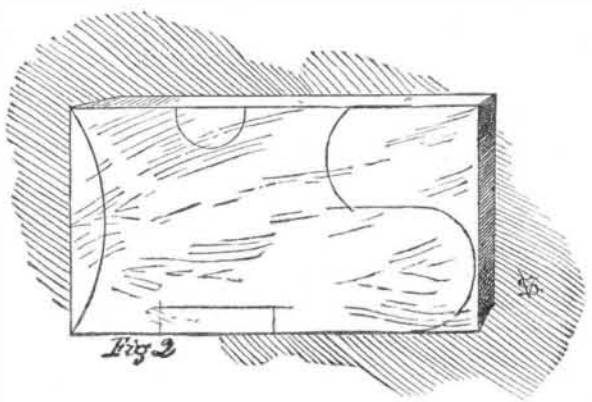


Fig 2

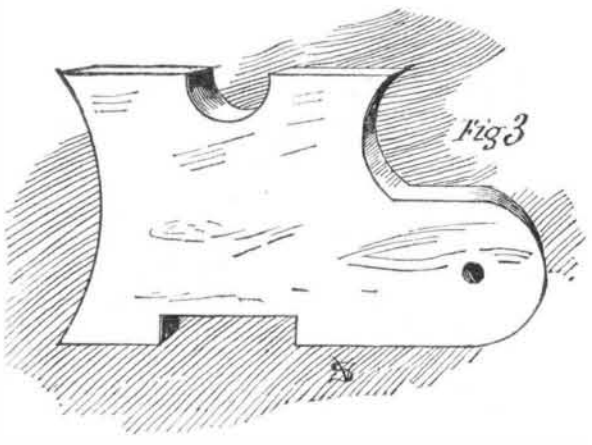


Fig 3

perfection that it utilizes only a small amount of the power residing in its fuel, we need new motors, and we shall get them; new metals and new methods of manufacture in the oldest metals."—*Midland Industrial Gazette.*

Sleeping Together.

Somebody has said that more quarrels occur between brothers, between sisters, between hired girls, between clerks in stores, between apprentices in mechanics' shops, between hired men, between husbands and wives, owing to electrical changes which their nervous systems undergo by lodging together night after night under the same bedclothes, than by any other disturbing cause. There is nothing that will so derange the nervous system of a person who is eliminative in nervous force than to lie all night in bed with another person who is absorbent in nervous force. The absorber will go to sleep and rest all night; while the eliminator will be tumbling and tossing, restless and nervous, and wake up in the morning fretful, peevish, fault-finding, and discouraged. No two persons, no matter who they are, should habitually sleep together. One will thrive and the other will lose.

THE AUTOMATIC FLUTE, AND HOW TO MAKE IT.

BY VICTOR SMEDLEY.

Most all boys have a natural love for music; with some it amounts to a passion, and such are happy and contented to


Fig 1

devote a large portion of their time in studying and practicing, to perfect themselves on some favorite instrument. Such are the favored few born with a musical talent, but a large majority, while they can enjoy and appreciate the music produced by others, lack the patience or application necessary to acquire the art. To all such this method will be doubly welcome, as it requires neither study, practice, nor teacher, and the only necessary expense will be ten cents for the tin whistle, which can be obtained at any toy shop. Paddy, when asked if he could play the flute, answered: "Sure, how do I know, whin I niver thried it?" To be sure this was a characteristic reply, but by following the instructions given below, any boy can play this flute on first trial.

For the ends two pieces of board about ⅜ of an inch thick, 2¼ inches wide, and 3½ inches long will be required. Mark on both of thesewith a lead pencil (as a guide in cutting them out) the shape shown in Fig. 2, with the exception of the circular incision in which the flute rests, which should be about one-third as deep in the one to be used at the tapering end as in the other; this is done that the upper part of the flute will be parallel with the roller. See Fig. 3. The lower incisions in the end pieces (1 inch wide and ⅜ of an inch deep) are for the ends of the connecting strips, A, to fit into. At about ⅝ of an inch from the ends of the projecting arms of both pieces bore holes for the axle of the roller to pass through, having them large enough to allow it to revolve in them freely. The connecting strip, A (see Fig. 4), 8½ inches long, should fit neatly the incisions that have already been made for it at the bottom of the end pieces; a single nail or screw at each end will hold it securely in place.

For the roller a piece of old broom handle, B (see Fig. 4), 7⅜ inches long, can be made to answer; the only objection to its use in the condition it is sawn from the broom is its not being of the same diameter all its length; this should be remedied by whittling down the thicker part (taking care to preserve its original rotundity) until it is of the same thickness at both ends. In the center of each end bore a hole about one inch deep of slightly less diameter than the wire to be used for the crank.

A crank is made of a piece of stout wire about 4½ inches long, bent to the shape as shown at C, in Fig. 4; the end that is to go into the roller should be hammered flat, as this will prevent its turning around in the roller.

To put the crank in place: First, put the roller in its proper position between the two projecting arms of the end pieces, then with a hammer drive the wire securely into the holes that have already been started for it.

Do not attempt to push it in with the hand, as it will spoil the effect of the flattened end of the wire.

Another piece of wire like that from which the crank was made, about 1½ inches long, will hold the other end of the roller in place.

Fig. 5 will show how the frame work will appear when finished.

The flute is held in position by a rubber band, D, or a piece of string passed around the thick end of the flute, then under the frame lengthwise and around the thinner end; this will hold it securely in place and also allow its being moved back or forward, if the holes do not exactly tally with those cut in the paper.

Common Manila wrapping paper, known in paper warehouses as Reigles, weighing 200 pounds to the ream, is of about the proper thickness on which to cut the tunes. It should be of one piece rather than several short ones joined together, as joints in the paper are apt to catch on the flute in passing over and prevent the regular winding of the roller.

The paper on which the notes are to be cut should be 7½ inches wide, the length depending on the number of notes there are in the air.

For "Yankee Doodle," which tune is shown in Fig. 6, a strip of paper five feet long will be needed.

In the center of this sheet six lines one inch (or the distance that the holes on your flute are) apart should be ruled the full length of the paper. Leave about four inches of blank paper before you begin cutting out the holes, to paste on the roller and reach from it to the flute.

At the last end of the tune there should be enough spare paper to fold and form a loop in which to put the weight that keeps the paper close to the whistle, in order not to allow the air to escape through any but the proper holes. Fig. 6 is a model of "Yankee Doodle," and shows the number and length of the holes that areto be cut. By following this as a copy (allowing the first four holes to be ⅛ inch long, the rest in the same proportion, by using a sharp pointed knife, the tune can be cut out with very little trouble.

The diagram (Fig. 7) will be of great assistance. It shows which holes are to be opened in order to produce any of the notes that the flute is capable of playing.

When a quarter note is to be cut out the hole should have a length of half an inch; for a half note a hole one inch long will be required; for a whole note two inches will be the re-

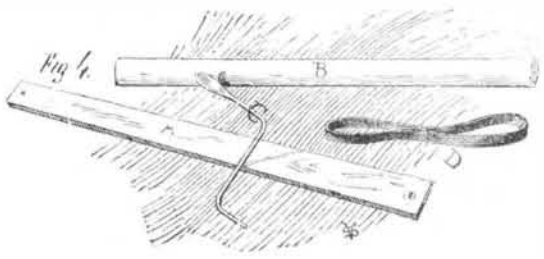


Fig 4.

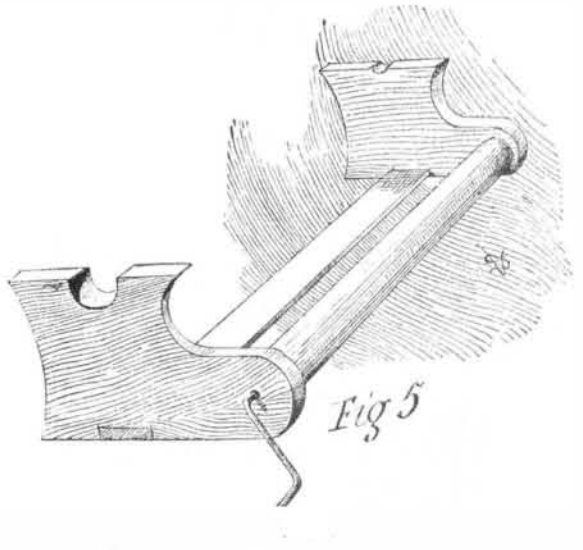


Fig 5

quired length of the hole. In width the holes are all the same, about one-half inch.

As there is in almost every family some one who understands music, by their aid you can cut out any melody, from a plain hymn tune to an operatic air, or make arrangements for a small orchestra of three or four instruments, thus producing a very pleasing effect.

Care should be taken to blow evenly, and not too strong, or tones will be played that are not intended. Fig. 8 shows the complete instrument. The flute made of tin may be bought for a few cents.

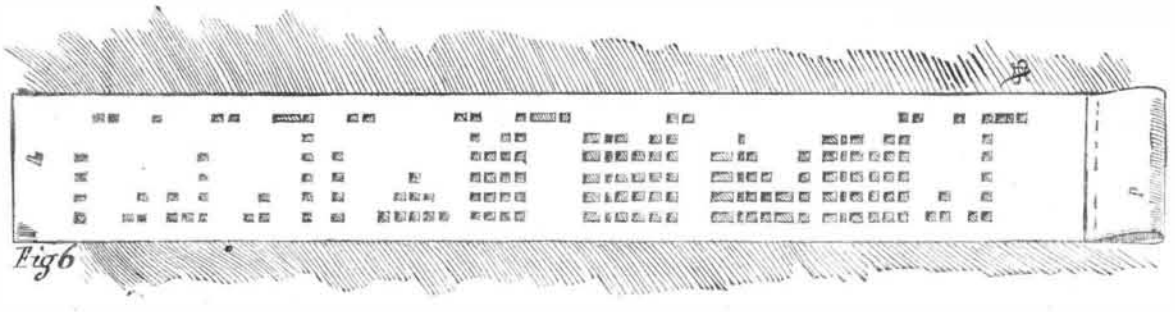


Fig 6

"YANKEE DOODLE" ARRANGED FOR THE AUTOMATIC FLUTE.

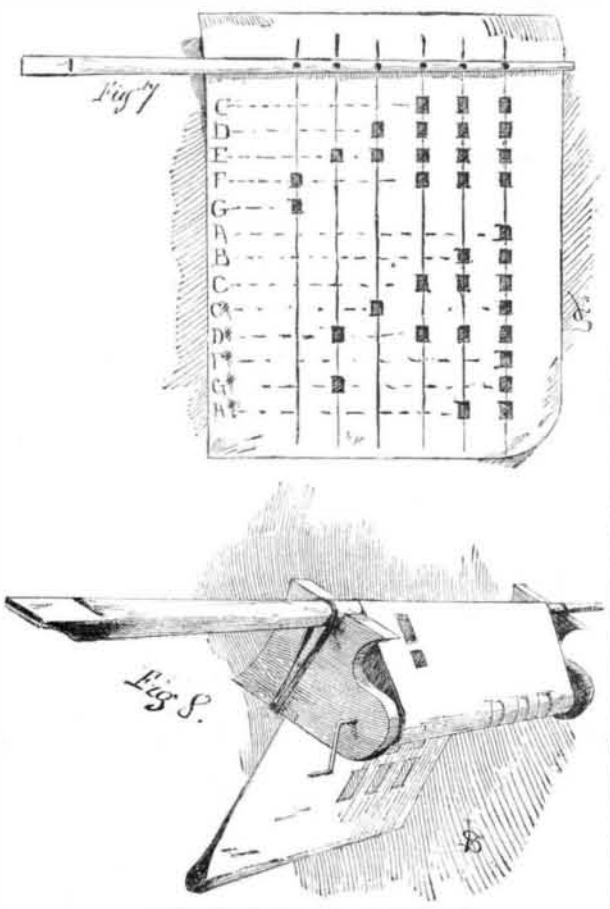
The Eyes Connected.

It has been shown by Knies and Horner, by injections of Prussian blue in dead bodies, that there is a direct communication between the two retinæ by the way of the optic nerves and chiasma. Pfluger has corroborated these assertions by making injections in dogs with a few drops of a saturated solution of fluorescine. This fluid is forced into the optic nerve, so that it passes not only into the subarachnoid but also into the subdural space. Two minutes after the injection both eyes showed a fluorescence of the retina, which persisted for five weeks. A small quantity injected into the orbital cellular tissue gave no result.

The Elevated Railways of New York.

Whatever may be said about monopoly, high fares, and watered stock, there is no local system of railways in the world that furnishes such admirable facilities for passenger transportation as the four lines of elevated roads in the city of New York. Since the trains commenced running on the two lines on the West Side, nearly six years ago, the traffic has steadily increased, until in the early and later hours of the day it is equal to the capacity of the trains, which run at intervals as short as safety will permit. The number of passengers carried on all the lines, comprising thirty-two miles of road, during the half year ending March 31, was over 46,000,000, and the whole number for the current year will probably fall but little short of 100,000,000. There can be no stronger evidence than this of the nature of the service rendered by these roads, not only to the vast population of the city proper, but to immense throngs of people from the suburban towns on every side, who come and go every day and at all hours of the day. The development of local passenger travel in the city within these few years has been tremendous.

The fares on the elevated roads are five cents during three hours in the morning and evening, which is the same as on the surface roads; and were it not that the cars on both are at such times equally crowded, it might be said that passengers have their choice between the two. The superiority of the former, however, is an ample compensation for the ten cent fares during the rest of the day. The speed of the trains, the capacious, easy riding cars, well warmed and lighted, the freedom from obstruction, comfortable stations and waiting rooms, with gate and platform men charged



THE INSTRUMENT COMPLETE.

with duties conducive to the safety and convenience of passengers, all contrast strongly with the absence of these most desirable things in the ordinary street car service. There is also a time schedule for all distances, which is adhered to with regularity and precision, and the average distance which a passenger is carried is five times what it is on the horse cars.—*Boston People's Fireside Journal.*

The Tunnel at Liverpool under the Mersey.

The great railway tunnel under the river Mersey is at the point of completion, and communication between the Lancashire and Cheshire shores will soon be opened. This engineering enterprise is just now of special interest to New York in view of the Hudson River tunnel enterprise.

The tunnel at Liverpool is a little short of a mile long, and, as usual in such undertakings, it has been bored simultaneously from both ends, with the intent to break from one perforation into the other near the middle of the river. The enterprise has required much patience, because the stream is deep. The entire tunnel had to be driven through rock. No check, however, has been experienced from encountering seams through which the water could break, and huge pumps have easily disposed of all ordinary leakings and drainage. The engines, working by compressed air or steam, for drawing away the refuse from the borers to the shafts and thence hoisting it to the surface, call for no special description.

Carefully lined with brick and cement, and having a width of twenty-six feet, the tunnel, lighted by electricity, will doubtless supply to general satisfaction the railway accommodation which has been the chief motive for its construction. It will take directly into the heart of Liverpool trains that hitherto have been forced to end their journey at Birkenhead, there transferring their freight and passengers to ferry boats. In Liverpool the tunnel will be continued so as to connect with all the converging lines of railways.

Correspondence.

Improved Nails Wanted.

To the Editor of the Scientific American:

I am a carpenter by trade, and find difficulty in driving the ordinary cut nails, owing to their square face on the point. A pointed nail will drive easier and nearer where it is wanted, and does not tear the wood as much. The square face carries more or less wood with it, making it scoot to one side, and very uncertain as to its direction.

On particular work I have taken a flat file, and by twirling the nail with the left hand, with the point of nail resting on a bearing, filed off the corners so as to leave only about half of the former face on the end, filing at about an angle of forty-five degrees, and it makes a vast difference in the driving, making a far better job.

Can you do or say anything to the nail makers to induce them to put a point on their nails, something like wire nails, but perhaps not quite so peaked or sharp, nor to a full point. This is of course more applicable to a finishing nail, but it would be of very much benefit for the ordinary nail; they can be stuck in their place with one blow, where two or more would be required with the square end, drive easier, and keep their direction better.

HAMILTON SHERMAN.

Waverly, Pa.

A Word with our Correspondents.

We have hesitated for some time speaking to our readers concerning the questions which are sent in to our Notes and Queries department, and we would like to correct the impression which seems to exist in the minds of some that the editorial department of the SCIENTIFIC AMERICAN is possessed of a wizard who longs to be questioned and who has answers always ready for any query which the curious may choose to put to him. Such, we beg leave to state, is not the case; the answers to most of the questions are only obtained after much study, and in some cases after we have been put to considerable expense to procure the desired information. We have always willingly done this, and we are still glad to serve our readers in any way we are able; we simply wish to call attention to the fact that nearly every question sent in requires some research to answer, and not infrequently costs us more than the price of a year's subscription to the paper to obtain the information. About two-thirds of the questions asked are answered by mail, so it is easy to judge by a glance at our Notes and Queries column what a mass of matter is sent in to us each week for reply.

We always answer every question that is asked, unless it is manifestly absurd or entirely out of our line. There is sometimes delay, owing to difficulty in obtaining the information or on account of the amount of matter awaiting publication.

No question should be sent on postal cards, or without a stamp for answer, for if the question is worth asking it is at least worth a stamp for reply. In cases where an early answer is especially desired, or where the information is for the benefit of the inquirer alone, a small remittance of $1 to $5 should be sent. Such letters take precedence, and are answered by letter, unless otherwise requested.

We refer to this subject, not to deter any one from asking questions, but to give us an opportunity to state to the individual inquirer what he has probably never realized before, and that is, that labor and money are expended to obtain from reliable sources answers to his and the multitude of other queries coming to this office. We actually pay out several thousand dollars a year to persons skilled in various departments of science and engineering for replying to these questions, besides what are answered in the editorial room of this paper.

Yankee Sardines.

It is said that fully nine-tenths of the so-called sardines consumed in this country come from the State of Maine. Very few of the genuine French fish are imported now. These Yankee sardines are nothing but small herring prepared and put up in boxes, with attractive labels and French inscriptions. In Eastport there are nineteen establishments devoted to the production of sardines, besides three at Lubec, two at Jonesport, and one each at Millbridge, Lamoine, and Robbinston. In 1876 a New York firm did a lucrative business packing "Russian sardines" in Eastport. These were little herring packed in small wooden kegs and preserved with spices of different kinds. It occurred to one member of the firm that these little fish might be utilized to better advantage by cooking them and packing them in olive oil, like the French sardines. The experiment had been attempted several years previous without success. The difficulty was to eradicate the taste of the herring. It was quite easy to cook the fish, pack them in olive oil in tin cans, and seal them air tight; but when they were opened they had not the rich, spicy flavor of the regular French sardines. After a great many experiments, one of the manufacturers succeeded in producing a compound of oil and condiments which removed the trouble.

The herring mostly used for making sardines are about four inches long, and are taken in immense quantities along the coast of Maine and New Brunswick. They can be purchased of the fishermen for about $5 a hogshead, although when the fish are scarce, as they often are in the spring, they bring as much as $15 a hogshead.

After being caught the fish are carried immediately to the factory and laid in heaps upon long tables. The first thing is to decapitate and clean the fish. The dexterity with which this operation is performed by the children who are employed is remarkable. On an average, seventy-five fish are cleaned and decapitated every minute by each child. Both operations are performed with one stroke of a sharp knife. A box holding about a bushel lies at the feet of each operator, and, as the cleaning is finished, the fish fall into the box. The pay for this work is ten cents a box, and some of the children make $1.50 per day.

The herring are pickled for half an hour, and are then laid upon trays and placed in a large drying room heated by steam. After drying, the fish are thrown into large, shallow pans of boiling oil, and thoroughly cooked. They are then packed in tin boxes by girls and women, and in each box is placed a quantity of the patent compound of oils and spices. Covers are then fitted to the boxes, and sealed on by men. As air must be excluded, the cans, when sealed, are placed in a tank of boiling water, where they remain half an hour, and are then removed and placed on an inclined plane, so that the air inside rushes to one corner of the box. This corner is punctured with an awl, the hot air escapes, and the can is made air tight by a drop of solder. The boxes are then ornamented with gay French labels, stating that the inclosed are "Sardines a la Francaise." Some are labeled, "A l'huile d'olive." The oil used is cotton seed oil, such as is made in South Carolina principally, and is not always the best even of that. The best oil is used, however, for fish sold as "prime."

An Evening with Other Worlds.

A very interesting lecture entitled as above was lately delivered before the American Astronomical Society, Brooklyn, N. Y., by Mr. Garrett P. Serviss, of the editorial staff of the New York *Sun*. This gentleman has an attractive style of delivery, a wide command of language, and a rare power of interesting his audiences. The large hall of the Long Island Historical Society was crowded. Among other things the speaker said the motion of the earth upon its axis, and the motion of the earth in its revolution around the sun, were secondary to another and a mightier motion whose rate had not been accurately computed. This was the motion of our entire planetary system through space. Each of the great scenes of human history which had taken place upon the mighty stage of this moving air ship from age to age had been in regions of the universe separated by millions of miles. Beyond this solar system was a region of suns and worlds so vast that the imagination was powerless before it, but into which we were advancing.

The first pictures cast upon the canvas were illustrative of Jupiter, its famous red spot of 1878, and its equatorial belts. The changes in these belts and in the red spot had told astronomers that the surface of Jupiter was not solid, like that of the earth, but liquid, gaseous. In the revolution of the planet the red spot had gradually passed by noticeable spots in the great equatorial belts, whereas upon a body like the earth they would have maintained their relative positions.

Jupiter, he said, was apparently a world in process of formation. There was one occasion when the speaker had gazed upon it with Prof. Young, through the great Princeton telescope, which magnified it fourteen hundred diameters, or many millions of times, when it presented a picture whose beauty it was impossible to portray in words.

From pictures of Jupiter under different conditions, some of them handsomely colored, the lecturer passed to several showing Saturn and his mysterious rings, which he said would more nearly present their flat surfaces to the earth in 1885 than for many years before, and would then be very beautiful objects. Changes in these rings, their broadening, and their gradual approach toward the planet since the sixteenth century, were shown by views.

Mars, cast upon the canvas as a great globe, with lines of latitude and longitude, continents, seas, and islands, was apparently very much like the earth. It was so well understood by astronomers, and its surface so well explored and so completely named, that an astronomer who might be cast upon it would have no difficulty in finding his way about and in telling the inhabitants more than they probably ever knew about their own Arctic regions. In successive pictures the marked changes in the Arctic regions in winter and summer were shown, and the fact was noted that it had changing seasons like our own.

"Venus," the speaker said, "is the most shy and provoking planet of all, since she persists in constantly hiding her face beneath clouds. There was every reason to believe that, more than any other planet, she was like the world, with rain and snow and changing seasons, and perhaps inhabitants."

The transits of Venus and Mercury were illustrated in successive pictures, and the surface of the dead moon, with its great mountains and its vast craters, was shown by several views. The lecture closed with a startling view of the earth as it would appear from the moon.

THE *American Angler*, a weekly publication of which Mr. Wm. C. Harris is editor, has recently issued some beautiful "portraits of fishes." They are printed on bristol board, 7 × 11 inches each, and include 23 engravings of fish killed in fresh water and 37 of fish killed in salt water. These portraits have been carefully drawn from nature, and equal in accuracy and minuteness of delineation any efforts heretofore made in this line.