as interlopers or trespassers, who must be watched, surrounded by restrictions, and compelled to surrender their property to whoever demands it.

In this country, the inventor is regarded as a public benefactor, enjoys entire freedom in the possession and working of his patent, is encouraged in his work, and honored by the people. It is chiefly when he goes before Patent Office officials that he meets with rebuffs and discouragements.

The proposed German law provides for a commission who shall decide as to the propriety of granting patents. Official fees small. Duration of the patent, 14 years. Annual payments to be made; neglect to pay forfeits the patent. Within six months after the application is made, but before the patent is granted, the applicant must show that the invention has been actually worked within the Empire. The Patent Office may extend the term for working to a year in special cases, and will then decide whether or not to grant the patent. Patentees are compelled to grant the right of use to any persons who desire; and if the parties cannot agree as to terms, the Patent Tribunal shall name the price which the inventor must accept. The government may use any invention, without negotiating with the patentee; the Tribunal will name a sum, which the patentee must accept, or get nothing.

A STREET RAILWAY IMPROVEMENT WANTED.

We publish in another column a note from the president of the Third Avenue Railway of this city, inviting the attention of inventors to a needed improvement in the joints of the rails of street railways. The Third Avenue Railway is one of the most extensively patronized roads in the world. Its length is eight miles, and it carries about thirty millions of passengers per annum. Its rails are spiked down upon longitudinal wooden beams, with an iron plate under the ends of the rails. In addition to the enormous traffic of the company, the rails are subjected to much wear and tear from heavy street vehicles. The improvement called for must be of such a nature as to be readily applied to existing rails.

A NEW DODGE.

We have frequently had occasion to warn patentees against the persistent efforts of designing persons in all parts of the country to abstract money from their pockets under various pretexts. The most numerous class of these impostors have hitherto been those who send circulars and letters to patentees, announcing their extraordinary facilities for selling patents, insinuating that they have a customer for the invention, etc., and all they require to consummate the sale is a power of attorney and a small fee in advance.

Our exposure has very nearly effected an extermination of their operations in this line, but now they turn up in a new *rôle*.

Instead of sellers of patents, they now appear as solicitors. They look through the list of patents each week, and write to the patentees, stating that their claims do not appear to cover the whole of their inventions, and advise reissues in each case, and set forth special facilities for obtaining these reissues. We have before us a letter from one of these reissue solicitors which a gentleman has sent us, with the usual enquiry as to what we know of the writer. The solicitor's letter goes on to state that his only means of judging of the *strength* of the patentee's claims was from the published report. The writer had not even read or seen the gentleman's patent, but he has written advising him to apply for a reissue, stating that for $70, including all fees, payable when the order is given, he will do his best to get broader claims; but, he adds, the inventor must take all risk of failure. The writer is evidently a novice at this new dodge, and is either very stupid or has a streak of inherent honesty left; for he admits, as before stated, that he has never seen the patent, and he also frankly states in another portion of his letter that he does not know whether the patent can be strengthened, adding truthfully that the result would depend altogether on what had been done in this line before the patentee made his application. But he winds up by stating that he believes that better claims can be "engineered through." What is meant by "engineering through" is not explained; but the expression would seem to be a part of the means used for impressing the patentee as to the magnitude of the solicitor's influence in getting allowed such claims as he may ask for.

It is not a large number that will be deceived by such specious communications; but some will be made nervous, and wonder to themselves if they have a valid patent. We would advise such persons to consult their own agents for information, but under no circumstances to place their business and money in the hands of these letter-writing solicitors, with whom they have no acquaintance.

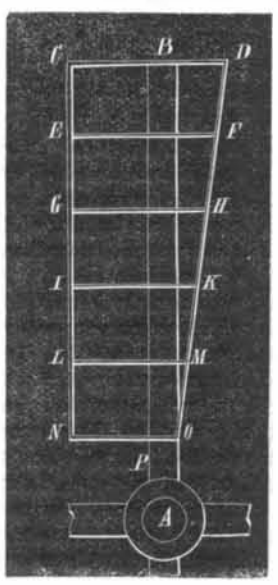
It is not often that unsolicited advice from a stranger is worth very much, and the motive that prompts it may usually be looked upon with suspicion. We do not assert that advice thus tendered is necessarily given from pernicious motives; but we believe that it is not wise to follow the advice of strangers whose opinion is volunteered; and that those who place their business in the hands of such persons will be likely to find the experiment an expensive one.

HOW TO BUILD A WINDMILL.

The principal data connected with windmills were discovered by experimenters early in the present century, the best proportions for sails being ascertained, and most of the important details of construction being worked out. We do not mean to say that manufacturers have made no improvements since that time, only that nothing of any great novelty has been produced. We must refer the reader to some standard treatise on mills and millwork, and to the circulars of manufacturers, for information in regard to the various details and patents, and will content ourselves with a description of a standard mode of construction and proportion. Windmills can be either horizontal or vertical, but the latter are almost exclusively employed. In the vertical windmill, the shaft is inclined to the horizon at an angle of from 5° to 15°, when the wheel is placed at the top of a tower; so that the wheel will clear the sides of the building, and allow space for the action of the wind. If the wheel is supported by a post, the shaft may be horizontal. The connection of the shaft with the pump or other mechanism may be made either with gearing, or by means of a crank and connecting rod. The shaft must be free to swing around in any direction, so that the wheel can always face the wind. It is moved, in the case of small windmills, by the use of a weather vane on the end of the shaft opposite to the wheel. With large windmills supported on towers, the top of the tower is generally arranged so that it can be rotated, and a small auxiliary wind wheel, connected by gearing, moves it into the proper position as the direction of the wind changes. The wheel of a windmill may be covered with cloth, or with slats of wood or metal, the cover in either case being technically known as the sail. It is frequently necessary to reef the sails, when the force of the wind increases; and windmills are often arranged so that this reefing is performed automatically. A common method of effecting this is to make the sail of a series of jointed slats, that present a close surface to wind of the ordinary velocity, and open, thereby decreasing the surface, as the velocity of the wind increases. A good number of the windmills in use, however, are covered with cloth, and reefed by hand as occasion requires. The best velocity for a windmill is such that its periphery moves about $2\frac{3}{5}$ times as fast as the wind. Thus, if the wind is moving at the rate of 20 feet a second, the tips of the sails should move at the rate of 52 feet a second, so that, if the wheel were 12 feet in diameter, it should make about 83 revolutions a minute. Of course, if the velocity of the wind varies greatly, it will be impossible to keep the speed constant, so that windmills are not ordinarily well suited for work requiring steady motion; although they answer very well for moving pumps, if an intermittent supply of power is not a serious obstacle. In some sections, however, the prevailing winds are quite steady, and in such cases windmills can be applied with advantage to grist mills and other useful work. The force and velocity of the wind can only be determined by experiment, but the results of previous experimenters may be useful to our readers, and we give below a summary of the most recent and reliable:

Velocity of wind. In feet per second.	Velocity of wind. In miles per hour.	Perpendicular force, in pounds per square foot.	Common expressions of the force of the wind.
10	6·82	0·33	Gentle pleasant wind.
20	13·64	0·91	Brisk gale.
30	20·56	2·04	Very brisk.
40	27·27	3·92	High wind.
50	34·09	6·25	Very high.
60	40·91	9·25	Very high.
70	47·73	12·75	A storm.
80	54·55	16·34	A storm.
90	61·36	20·74	A great storm.
100	68·18	25·28	
110	75·02	30·89	
120	81·84	36·75	A hurricane.
130	88·65	43·26	A hurricane.
140	95·47	50·32	A violent hurricane.
150	102·29	57·56	A violent hurricane.

In the accompanying figure is shown one of the four sails of a windmill, it having been found that four sails of proper proportion produce the best effect. The piece, P B, is called the whip of the sail; C D, E F, G H, etc., the bars of the sail. The bars are inclined to the plane of revolution, at different angles, the angle made by any part of the sail with this plane being called the weather of the sail. Making the distances A O, N L, L I, etc., each equal to $\frac{1}{12}$ of the diameter of the wheel, the best values for the angle of weather are as follows:



For C D—7°
For N O—18°
For L M—19°
For J K—18°
For G H—16°
For E F—12½°

The sail stretched over these bars will be a warped surface, somewhat resembling the blade of a screw propeller. The part B D O, called the leading sail, is triangular, and B D is $\frac{1}{15}$ of the diameter of the wheel, B C being $\frac{1}{10}$, and C N, $\frac{5}{12}$, of the diameter. The main body of the sail, B C N O, is commonly rectangular. A windmill of the best proportions, running under the most favorable circumstances, utilizes about $\frac{29}{100}$ of the energy of the wind that acts on an area equal to a circle having the same diameter as the wheel. It would not be advisable to count on realizing more than half this power in general practice; and on this assumption, we have the following empirical rule, for determining the diameter of a wheel, to give a certain amount of power, with an assumed velocity of the wind:

Divide the required horse power by the cube of the velocity of the wind in feet per second, take the square root of the quotient, and multiply it by the number 2024·8. The product will be the required diameter in feet. An example illustrative of the preceding principles is appended. A windmill is to be erected in a locality where the general velocity of the wind is about 20 feet per second. It is to be attached to a pump, the work required of it being to raise 1,000 gallons of water per hour through a hight of 20 feet: 1,000 United States gallons of water weigh about 8,320 pounds, and, taking into effect the resistance of the pump, the power required will be about $\frac{1}{6}$ of a horse power, or 0·167 horse power. Dividing this by 8,000, the cube of the velocity of the wind, extracting the square root, and multiplying by 2024·8, we obtain 9¼ feet as the required diameter of the wheel. Referring to the figure, we find that, in this case, C N is 3 feet 10¼ inches, B D, 7⅞ inches, and B C, $11\frac{3}{32}$ inches. The velocity of the tips of the sails should be 52 feet per second, or the the wheel should make about 108 revolutions a minute. These explanations will probably be sufficient to enable any of our readers who desire it to construct a wheel, and we shall be glad to hear of the success of their efforts.

SCIENTIFIC AND PRACTICAL INFORMATION.

NITRO-GLYCERIN.

Professor Mowbray, in a recent lecture before the Stevens Institute of Technology, on the subject of explosives, stated that nitro-glycerin is now largely made from the fatty waste of stearin and soap factories. Its density, which is 1·6, water being 1, enables it to exercise its tremendous force; for in a given bulk, there is 60 per cent more gaseous matter than would be contained in it were it only of the density of water.

NEW IMITATION SILVER ORNAMENTS.

In several stores in Munich various objects of art have lately been displayed, which are remarkable for their brilliant silver hue. It appears that they are mere plaster models covered with a thin coat of mica powder, which perfectly replaces the ordinary metallic substances. The mica plates are first cleaned and bleached by fire, boiled in hydrochloric acid, and washed and dried. The material is then finely powdered, sifted, and mingled with collodion, which serves as a vehicle for applying the compound with a paint brush. The objects thus prepared can be washed in water, and are not liable to be injured by sulphuretted gases or dust. The collodion adheres perfectly to glass, porcelain, wood, metal, or *papier maché*. The mica can be easily tinted in different colors, thus adding to the beauty of the ornamentation.

NEW PROCESS OF GILDING ON GLASS.

Professor Schwarzenbach, of Berne, has recently devised the following new method of gilding on glass: Pure chloride of gold is dissolved in water. The solution is filtered and diluted until, in twenty quarts of water, but fifteen grains of gold is contained. It is then rendered alkaline by the addition of soda. In order to reduce the gold chloride, alcohol saturated with marsh gas and diluted with its own volume of water is used. The reaction which ensues results in the deposition of metallic gold and the neutralization of the hydrochloric acid by the soda.

In practice, to gild a plate of glass, the object is first cleaned and placed above a second plate slightly larger, a space of about one tenth of an inch separating the two. Into this space the alkaline solution is poured, the reducing agent being added immediately before use. After two or three hours repose the gilding is solidly fixed, when the plate may be removed and washed.

The Clark Revolving Shutter.

It is announced in the advertising columns of this issue that Messrs. Clark & Company, of London, Eng., patentees and manufacturers of self-coiling shutters made of steel, iron, or wood, have an agency at 218 West 26th street in this city. Messrs. Clark & Company's shutters are to be found in all parts of the world, and are known for their ease in working, security against burglars, and finished and ornamental appearance. The firm have other branches at Boston, Mass., Dublin, Edinburgh, Manchester, Liverpool, Melbourne (Australia), Paris, Berlin, and Vienna, their headquarters in London being a very large and complete manufacturing establishment. In New York city, the Clark shutters are to be seen on the new building for the Lenox library, 100 of them having been put into the structure; and the Delaware and Hudson Canal Company's new building and the *Tribune* offices are also being supplied with them. They are to be seen in many other of our principal cities, and there cannot be two opinions as to their convenience and efficacy in use and light and ornamental appearance.

NEW subscribers to the SCIENTIFIC AMERICAN will hereafter receive the papers from the time of our receiving the order, unless they specify some other date for commencing. All the back numbers from the commencement of the volume (January 1) may be had if requested at the time of sending the order, or on request, after receipt of first number.

PREPARING SOIL FOR POTTING.—We find the following under the heading of "House Plants" in a popular and excellent family magazine: "Ladies who find their efforts to raise house plants frustrated by worms may be able to win success by boiling the earth before setting the plants. Use little water, and allow it to simmer away after a few minutes of hard boil."

THE New York city authorities, who once peremptorily refused to allow the American Telegraph Company to lay its wires underground, are now seeking to compel all the companies to bury their wires.