No. 1, or hard solder, of the shops, will, as a rule, be found and he was further required to exhibit the same to any perto vary between one and a half to two of lead, and one of tin. son who might demand to see it. The common stuff-that which plumbers use for making wipe joints in lead pipes-contains from two and a half to is unauthorized, that property in inventions exists by virtue three parts of lead and one of tin. Such a mixture as this of the laws of Congress, and that no State has a right to inmelts at less than 500°, that is, considerably below the melt-terfere with its enjoyment, or annex conditions to the grant. ing point of lead, and has the property of remaining semi- If the patentee complies with the laws of Congress on the fluid for some little time, so that, with a thick pad anointed subject, he has a right to go into the open market anywhere with grease, the plumber is able to mold it to any desired within the United States and sell his property. If this were shape. To render the solder hard without increasing the not so, a State might nullify the laws of Congress and destroy proportion of tin, some makers add a little antimony or cop- the powers conferred by the constitution. per, which has the effect of raising the fusing point without affecting the other qualities of the alloy. Although we have yet repealed their obnoxious patent laws; and for the conspoken of hard and soft solder in regard to alloys of lead and tin, it is better to retain the names now employed in commerce, coarse, common, and fine; and when we wish to make | Court, above alluded to, may be found printed in full on page solder, to confine ourselves to the proportions mentioned as 137, Vol. XXV of the SCIENTIFIC AMERICAN, date of August nearly as possible, for accuracy is not material. The me- 26, 1871. chanic by "hard solder" understands an alloy for uniting metals that are difficult to melt-a compound of copper and zinc, sometimes with a little tin-a brass, in fact; hence the term brazing has been substituted for soldering.-English Mechanic.

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BOGUS STATE LAWS CONCERNING PATENT RIGHTS.

commerce, it is very rare that the tin exceeds the lead, and copy of the affidavit was also given to the patentee or seller, and if the results are reported correctly, the work reflects

The United States Court held that this kind of legislation

We believe there are some Western States that have not venience of district attorneys, lawyers, and patentees, we will state that the decision of the United States Circut;

METALINE AT THE AMERICAN INSTITUTE.

Metaline is an alloy which, when applied to machinery, is alleged to obviate the necessity of oil or other lubricants. But while we are told that it runs on everything from watchmakers' tools to big steam engines, one of its most recent applications has proved far from beneficial-in fact, instead of making the constituent parts move nicely, it has set them to grinding, cutting, jarring, heating, and disaggregating in a manner really sad to contemplate. We allude to that rather cumbrous machine known as the American Institute, the whole inner mechanism of which metaline has appar ently disorganized. At the late Fair, it failed to slide smoothly through the hands of the judges, managers, and directors, and it drove the Board of the last mentioned so (morally) out of true that Professor Chandler, because the Institute gave a silver medal to metaline instead of a gold one, deliberately cut both the Board and the Institute. He resigned-he waxed warm in the journals-daily ones-he said that parts of the Board were welding themselves into a conspiracy. The alleged conspirators then published a long effusion, denying mechanism. In regard to this mechanism, it appears that a the soft impeachment.

To make matters still worse, metaline turns up again as the disorganizing element of the rotary engine tests. It did more difficult to construct them of the requisite strength and not clog the engines, but it apparently did the Fair official who supervised them. We hear of a protest to the results of the trials because the Superintendent of the Machinery, who made the calculations and had something-we know not what-to do in the way of supervision, was at the time engaged in negotiating with the successful competitor for a sale to the latter of metaline stock, and has since maintained business relations with him. Certainly no person acquainted with the gentleman will venture the assertion that he could be biased, even in prospect of a possible fat commission; but those who have denounced the tests to us, for reasons best known to themselves, as unfair, claim that such dealings on the part of an Institute official are sufficient, on their face, to invalidate the results of so very close a ccmpetition.

The award of silver instead of gold to metaline, and other equally important misdemeanors, form leading arguments against the present management by the opponents of the bill now before the New York Legislature, which the existing officers of the Institute want to have passed. This bill provides for a president and twelve trustees as substitutes for the unwieldy Boards of Managers and Directors now in esse. Both the metaline people and the Institute people include names which will be equally powerful in commanding the confidence of the public. The opponents of the bill assert that the measure has never been submitted to the Board of Direction or to the members generally, and that the present management attempted to rush it through the Legislature and have an election before a tithe of the members found out method of moving the aerial vessel, however, does not preabout it. A ring, it is alleged, would thus get themselves sent so many difficulties as the means to be provided for elected, and would be able to keep themselves in power in- keeping it in the air, and enabling it to rise or descend, at the definitely by exercising a right which the bill gives them to fill places among the trustees vacated by resignation, etc. balloon attached to it, in which case, as the moving surface This matter, however, appears to be a purely internecine is largely increased, it must have a more powerful motor; war, and one which we have no doubt can be brought to a | or either vertical propellers, or an immovable plane, can be just conclusion by the exercise of good sense and moderation employed. A kite is sustained in the air by the pressure of on both sides.

ACCURATE ALIGNMENTS.

to the unconstitutionality of various State laws, by which particulars of the tunnel through the Musconetcong Moun- and a fixed plane surface on the aerial ship, in an inclined local legislatures have attempted to regulate or prevent the tain, on the line of the Easton and Amboy Railroad. The position, will sustain the vessel when it is put in motion sale of patent rights within their borders. In some of the length of the tunnel is about 5,000 feet, through a mountain This fixed surface seems to be the simplest mechanism that

great credit upon the engineers having it in charge.

In this connection, we may mention a statement, in a Virginia paper, that an engineer, in the employ of the Belcher Mining Company, in joining two drifts by a short tunnel, 128¹/₂ feet in length, could not detect any error in the alignment, after the two headings were connected.

The Hoosac tunnel, it may be remembered, is 25,031 feet long, and there is an ascending grade of twenty-six and four tenths feet to the mile, from each end to the central shaft. On testing the work, after the completion of the tunnel, it was found that the error in alignment was nine sixteenths of an inch, and the difference of level, between the two headings, at the central shaft, one inch and a half.

While upon the subject of "great bores," some reference to the Mont Cenis Tunnel may not be out of place. This is about 40,000 feet in length; the level in the Italian side is about 435 feet above that of the French side, and the level at the summit, where the two headings meet, is about ten feet above the level at the Italian end of the tunnel; so that the two headings run to meet each other on very different ascending grades. On testing the work, after the two headings were joined, it was found that the heading from the French end was about twenty-four inches too high, and the error of alignment was about eighteen inches.

FLYING MACHINES.

We have recently perused a very interesting paper by Dr. Barnard, of Columbia College, in which the writer, in his charming style, discourses of "Aerial Navigation," giving both his own views and the results of the researches of M. Bruignac, a French mathematician. As many of our readers are devising plans for sailing in the air, we think it well to give a brief resumé of Dr. Barnard's article.

As birds fly with wings, it occurred to man to employ the same device—but only to meet with failure. The reason of this is obvious. A bird has sufficient strength to fly, and a man has not. Hence the conclusion that, if a man wishes to fly, he must use some artificial motor to drive the necessary revolving wheel, such as a propeller, is better than a pair of wings, since the latter have an intermittent motion, and it is still have them light. At this stage of the inquiry, it becomes necessary to determine, by experiment, the effect of a revolving wheel in propelling a machine through the air. If the wind strikes against a plane surface, it creates a certain amount of pressure, depending upon its velocity; and inversely, if a surface is made to revolve at a high velocity, it encounters a resistance according to the velocity. M. Bruignac's experiments upon the pressure of the wind give the following results:

VELOCITY OF THE WIND.		PRESSURE.	
In feet per second.	In miles per hour.	In pounds per sqr. foot.	In pounds per sar inch.
88	22:495	2.75	0.0191
49	83.406	6.17	0.0428
65	44.319	11.00	0.0764
98	66 815	24.50	0.1201
147	100.243	55·50	0.3824

Instead of making the aerial vessel with a flat end, it can have a conical form, by which the pressure of the air, or the resistance that it must overcome, can be reduced to about $\frac{1}{2}$ of the amount required in the case of a flat surface of the same cross section. It is to be expected that the machine cannot always sail in a calm; and on the supposition that it is to carry only one man, and is to advance at the rate of 20 miles an hour against a wind of the same velocity, it must have a motor capable of exerting about 5 horse power. The pleasure of the navigator. It can be kept up by having a the wind against it, provided the direction of the wind is oblique to its surface; and it is easy to see that, if the kite were moved through calm air at the same velocity as the We have heretofore, on several occasions, called attention We have a slip from a Philadelphia paper, giving some wind has, it would be sustained in exactly the same manner,

States, laws have been passed by which patentees or their some 450 feet above grade. In making a tunnel, as our read- can be devised for the flying machine, in connection with two agents who offer patent rights for sale, without complying ers doubtless know, we have given a hill in which a hole is propeller wheels, turning in opposite directions, so as to with certain State regulations, are made liable to fine and im- to be bored, the position of the ends of the hole, and the keep the machine in an upright position. The best angle of prisonment.

United States; and any State judge or officer who should, that they will meet in the middle of the hill. The length, States.

patent right in that State unless the patentee or seller first | line about one three-hundredth of an inch where the headdeposited a copy of the patent with the county clerk, and ings met, and that the grades of the two headings, where made affidavit that the copy was genuine, had not been re- they met, coincided to within one eight-hundredth of an inch. voked, and that he was authorized to sell, etc. A certified ; The measurements were made with ordinary instruments;

We need hardly say that all such State laws are without at once, one from each end, it is very desirable that they least amount of surface is required, is 54° 10' with a horizonbinding force, and are in direct conflict with the laws of the should be on the same line, and should conform to grade, so tal line; but the power required for motion in this case is under pretence of a State law, arrest or interfere with a pat- direction, and grade of the headings must then be calculated face and a horizontal line, the power required for propulsion entee or his agent in the sale of a patent right, would be lia- from outside measurements; and it becomes an interesting is diminished; but it is necessary to give the machine a ble for damages and punishment in the Courts of the United matter, after the work is completed, to see how closely the much higher velocity, in order that it may be sustained in lines, as actually run, conform to the requirements. In the the air; or if the original velocity is retained, the area of

Indiana. The law in question made it unlawful to sell a that the center lines of the two headings were only out of from an elevation.

grade at which it is to be run; and as two headings are run, inclination of the fixed plane, that is, the angle in which the very great. By reducing the angle between the fixed sur-This question was adjudicated by the United States Court case of the Musconetcong Tunnel, the statements are made the fixed surface must be largely increased, which will of in the case of John Robinson, agent for the Goodyear Rubber that the length, as ascertained by chaining over the moun- course add to the weight. It must be remembered, also, Dental Plates patent, who, on offering to sell a right under tain, only differed from the actual length, measured after that the machine will not be sustained unless it is in motion, the patent, was arrested and imprisoned under a State law of the headings were completed, by six and four tenths inches, so that it cannot rise from the ground, but must be launched

M. Bruignac finds, from a number of calculations, that, by attaching balloons to flying machines, they can be propelled by the aid of less power than in the case where a sustaining plane surface is used. The best form of balloon is that of a