against the ends or heads of the barrel, and are held in place by the latch, the barrel being rolled or trundled by means of the handle-rod.

An improved window reflector or mirror, which is readily adjustable in its inclination to the window and in its inclination to the vertical plane, to provide for exhibiting objects at a greater or less distance and at different heights from the ground, has been patented by Mr. Andrew G. Moodhe, of Stillwater, Minn. The invention consists in a window reflector composed of two mirrors, each pivoted at the middle of the adjoining ends to a plate in which a small shaft is loosely mounted, having a hand wheel on one end and a pinion at the other end, which pinion engages with two curved racks pivoted to the inner sides of the mirror, whereby the inclination or angle of these two mirrors will be varied by rotating the pinion. The lower ends of the mirrors are connected by small wires with a transverse strip pivoted to the lower end of the plate to which the mirrors are pivoted, and provided with a small shaft with a hand wheel at the end for changing the vertical inclination of the mirrors.

Mr. Jacob R. Scott, of Nyack, N. Y., has patented an improvement in machines for sewing boots and shoes, which supplies a desired need in a very simple manner. This invention relates to sewing machines for sewing boots and shoes, or materials varying in thickness, and its object is to obtain a variable stroke of the needle regulated by the movement of the presser bar, according to the thickness of material being sewed. The invention consists in a cam sleeve fitted for movement by a cam on the presser bar, and arranged to raise the fulcrum post of the needle bar as the presser bar is raised, so that the presser bar being positioned by the thickness of material, the fulcrum post of the needle is correspondingly positioned.

An improvement in invalid bedsteads, which provides for the more convenient adjustment of the pivoted head, back, and leg or foot rests of the bed, and for the use of suitable vessels with its mattress for the relief of the patient, has been patented by Mr. George B. Davis, of Richmond, Va. This invention consists in a combination with a pivoted head and back rest, of one or more springs for holding said rest in an inclined position when the patient is resting thereon, and a strap passing over a pulley or roller and secured by a buckle, for compressing said spring to vary the inclination of the rest and to hold it in any desired position. The foot rest of the bed is also pivoted, and may be raised or lowered and held by a strap. The invention also consists in the combination with the mattress having a hole in it for the use of a suitable utensil below it, of a cushion or pad closing said hole, and levers for supporting the pad when closing the hole, and providing for its removal out of the way when necessary to expose said hole.

IMPROVED FIRE ESCAPE.

The recent calamitous fire in the Ring Theater, at Vienna, in which more than seven hundred human beings were destroyed; the burning of the Brooklyn Theater, in which more than three hundred persons lost their lives; and the frequent occurrence of catastrophes of this kind, demand the provision not only of all possible means of preventing and extinguishing fires, but also of every practicable way of escape from the burning building.

In most theaters and places of amusement the ground floors are provided with exits on the ground, level or at least within a short distance of it, but the galleries are usually destitute of sufficient means of escape.

The engraving shows a device patented by Mr. J. F. Werner, of 62 Center Street, New York city, which is intended to meet this particular case.

The invention consists, mainly, of a movable floor, suspended by chains from near the ceiling of the entrances, halls, and vestibules, or by hinges on the side walls, and lowered in case of fire, to be supported on projecting rests of the side walls, at suitable height above the floor. Sliding extensions and swinging stairs and rear sectious connect with the ground outside of the door, and with the staircases of the gallery, so as to form separate exits above the regular entrances.

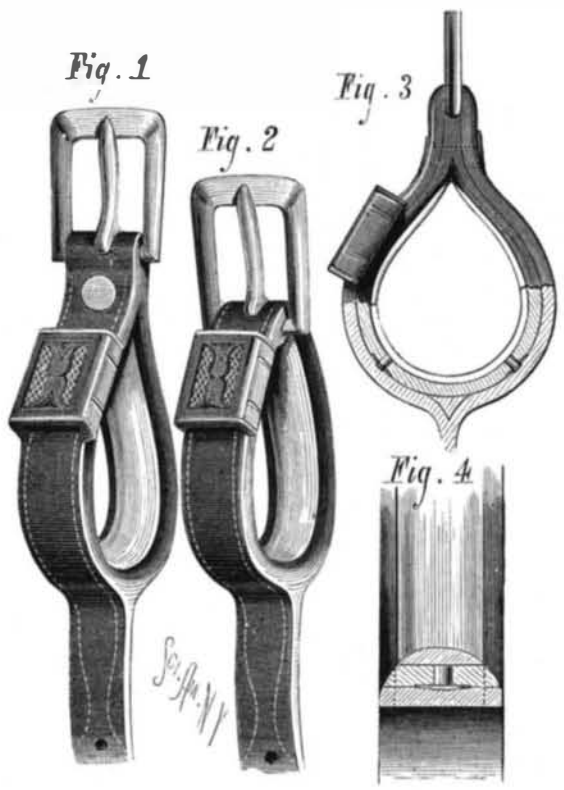
In case of fire the floor is lowered, the swinging sections and stairs swung down, and thereby a second passage formed, which is mainly designed for the people in the galleries, so that they may pass out simultaneously, and without interfering with the people in the parquet.

As it is a matter of experience that the greatest delay in the passage of the people is caused by the choking up of the entrances by the persons rushing out from the parquet, so that those in the galleries have less chance of escape, it is obvious that a practical means by which direct and unobstructed exit for the people in the galleries may be obtained will in a great measure obviate the danger arising from the present defective construction of our theaters. The means described change every entrance hall of a theater into two passages, so that the people may get out in half the time. The galleries are quickly emptied by means of the fire escapes of the entrances, the people being compelled by the bridge sections to pass on to and over the movable floors and their extensions and stairs to the outside of the building. If desired, additional movable stairs, running parallel to and being suspended in analogous manner to the movable floor, may be arranged in the lower parts of the staircases of the galleries, so that they may also be divided in their height into two passages, that form additional safety devices for the people.

WERNER'S FIRE ESCAPE.

IMPROVED THILL TUG.

The engraving represents an improved thill tug recently patented by Mr. Charles B. Pineo, of Bar Harbor, Hancock County, Me. In this device the strap which surrounds the thill is provided with a rigid metallic lining, which is somewhat narrower than the strap, and is made inwardly convex, so as to take the friction and wear of the thill. The lining also keeps the loop distended, so that it is not drawn tightly against the sides of the thill.



PINEO'S THILL TUG.

The advantages secured by this improvement are, that the thill tug wears much longer than the ordinary leather tug, and, as it is impossible for it to catch on the thill, the horse can go out of the thills unharnessed, whereas with the ordinary tug it is a common thing for it to catch, and, by sliding the saddle, make the horse's back sore.

This new thill tug can be put into the finest harness without injury to its appearance, as it almost invisible when the thill is in the tug, and it is incapable of marring the thill, as it has no sharp metallic edges.

The metallic lining is fastened to the leather lining by four rivets or pins cast on the metal lining. These pins pass through the leather lining and are provided with a bar and headed down.

The engraving shows two forms of thill tug; one (Fig. 1) with the leather straps riveted together below the buckle, the other (Fig. 2) with the buckle at the end of the loop. Fig. 3 shows a side view of the tug partly in section, and Fig. 4 is a vertical transverse section.

Tannic Acid by Dialysis.

Kohlrausch sets out with the law that equalization takes place between liquids f different concentration, and for this reason, in tanning leather, when tannic acid particles have been dissolved in the lye, they reach all parts of the surrounding liquid and reach the leather, penetrating its membranes by osmotic action. Part of it unites with the fibers, while part of it is deposited between them. This action is an uninterrupted one, and is repeated as long as the fibers are able to take up more tannic acid, or the solution to give up more. From these considerations Kohlrausch concluded that, not only does the tannin get into the hide by osmosis, but that it must pass through the permeable membrane of the plant cells in a similar manner, since by the chemical and microscopic examination it is seen that the interior and uninjured cells act just the same as the external pieces of thick bark that have been used. Hence it cannot be a simple solution of the tannin that has been exposed by grinding the bark which reaches the hide and is taken up by osmosis, but there must also be dialysis, partially free and partially membranous, of the tannin, the latter taking place through the permeable membrane of the plant cells, just as it does through the animal membrane of the hide.

These hypotheses have been confirmed by practical experiments, and a large factory has been built in Vienna and is working profitably by this method. The rasping and grinding of the bark is no longer necessary, since it can be used in larger pieces. The dialysis of the tannin takes place in a battery of closed vessels. The loss that was unavoidable in the old process, owing to decomposition setting in, is here reduced to a minimum by excluding the air. Generally about 96 to 97 per cent of the tannin is obtained, as in gall-nuts, and even in pine and fir barks, where the rosin that accompanies it renders its extraction more difficult, they claim to get 92 per cent, and from the oak bark 100 per cent of its tannin, while by previous methods the loss approached 40 per cent. The new process threatens to revolutionize the whole tanning operations, but especially the manufacture of extracts, not only of tannin, but also of most vegetable dyestuffs soluble in water or alcohol. D. J.

Antarctic Whales.

With regard to animals, we saw not a single seal on the ice or in the water during our southern trip. No doubt we did not go far enough south or sufficiently among the pack ice to meet with them.

When we were off the pack ice, and especially when we neared the Antarctic Circle, whales were extremely abundant, apparently all of one species, a "finback," probably the southern "finner" (*Physalus australis*). I saw no right whale among them at all.

As these whales moved under water close to the ship the light reflected from their bodies lighted up the water around and enabled one to follow their movements.

I several times went away in a small boat from the ship to shoot birds for our collection. On these occasions the whales sometimes blew quite close to the boat.

The appearance of a whale's spout, as seen from the level of the sea, is very different from that which it has when seen from the deck of a ship; it appears so much higher, and shoots up into the air like a fountain discharged from a very fine rose. The whale, of course, in reality does not discharge water, but only its breath. this, however, in rushing up into the air, hot from the animal's body, has its moisture condensed to form a sort of rain, and the colder the air, just as in the case of our own breath, the more marked the result. When the spout is made with the blowhole clear above the surface of the water it appears like a sudden jet of steam from a boiler.

When effected, as it sometimes is, before the blowhole reaches the surface, a low fountain, as from a street fire plug, is formed, and when the hole is close to the surface at the moment, a little water is sent up with the tall jet of steam.

The cloud blown up does not disappear at once, but hangs a little while, and is often seen to drift a short distance with the wind.

The expiratory sound is very loud when heard close by, and is a sort of deep bass snort, extremely loud and somewhat prolonged; it might even be compared to the sound produced by the rushing of steam at high pressure from a large pipe.

Smaller cetaceans, probably of a kind of gram pus (*Orca*) were very common near the Circle. These had a high dorsal fin placed at about the middle of the length of their bodies. Immediately behind the fin there was a large white saddle shaped patch, extending across their back, and they had, further, a conspicuous white blotch on each side, just behind the head and in front of the flippers.

The white patches contrasted strongly with the dark general color of the body.

These grampuses swam about in small shoals, with their high dorsal fins projecting far out of the water, like those of sharks do sometimes, and also those of swordfish.

The grampuses seemed habitually to swim thus, and the group of pointed sickle-shaped black objects moving through the water had a curious appearance at a distance. I cannot

identify this grampus with a described species.—*H. N. Mosely, Notes on the Challenger.*

"Cold Catching."

It is noteworthy as a curious yet easily explicable fact, that few persons take cold who are not either self-consciously careful, or fearful, of the consequences of exposure. If the attention be wholly diverted from the existence of danger, by some supreme concentration of thought, as, for example, when escaping from a house on fire or plunging into cold water to save life—the effects of "chill" are seldom experienced. This alone should serve to suggest that the influence exerted by cold falls on the nervous system. The immediate effects of a displacement of blood from the surface, and its determination to the internal organs, are not, as was once supposed, sufficient to produce the sort of congestion that issues in inflammation. If it were so, an inflammatory condition would be the common characteristic of our bodily state. When the vascular system is healthy, and that part of the nervous apparatus by which the caliber of the vessels is controlled performs its proper functions normally, any disturbance of equilibrium in the circulatory system which may have been produced by external cold will be quickly adjusted. It is, therefore, on the state of the nervous system that everything depends, and it is, as we have said, on the nervous system the stress of a "chill" falls. Consciousness is *one* element in the production of a *cold*, and when that is wanting the phenomenon is not very likely to ensue.

It is in this way that persons who do not cultivate the fear of cold-catching are not, as a rule, subject to this infliction. This is one reason why the habit of wrapping-up tends to create a morbid susceptibility. The mind by its fear-begetting precaution keeps the nervous system on the alert for impressions of cold, and the centers are, so to say, panic-stricken when even a slight sensation occurs. Cold applied to the surface, even in the form of a gentle current of air somewhat lower in temperature than the skin, will produce the "feeling" of "chill." Conversely a thought will often give rise to the "feeling" of cold applied to the surface—for example, of "cold water running down the back." Many of the sensations of cold or heat which are experienced by the hypersensitive have no external cause. They are purely ideational in their mode of origination, and ideal in fact.—*Lancet.*

Effect of Compression on Solids.

According to the *Revue Scientifique*, Mr. W. Spring, a German chemist, has recently published an interesting memoir, giving the result of a series of experiments undertaken to ascertain the effect of powerful compression on the most diverse bodies.

The substances experimented with were taken in the form of fine powder, and submitted, in a steel mould, to pressures varying from 2,000 to 7,000 atmospheres, or about 7,000 kilogrammes per square centimeter. The facts observed are given in a series of tables, from which we extract some of the more curious results.

Lead filings at a pressure of 2,000 atmospheres were transformed into a solid block, which no longer showed the least grain under the microscope, and the density of which was 11·5, while that of ordinary lead is 11·3 only. At 5,000 atmospheres the lead became like a fluid and ran out through all the interstices of the apparatus.

The powders of zinc and bismuth, at 5,000 to 6,000 atmospheres, gave solid blocks having a *crystalline* fracture. Toward 6,000 atmospheres zinc and tin appeared to liquefy. Powder of prismatic sulphur was transformed into a solid block of octahedric sulphur. Soft sulphur and octahedric sulphur led to the same result as prismatic. Red phosphorus appeared also to pass into the denser state of black phosphorus.

As may be seen from this, simple bodies undergo chemical transformations by the simple action of pressure. The change of amorphous powders, like that of zinc, into crystalline masses, is a sort of self-combination. Certain hard metals do not lose their pulverulent structure at any pressure.

Binoxide of manganese and the sulphides of zinc and lead in powder weld when compressed, and exhibit the appearance, respectively, of natural crystallized pyrolusite, blende, and galena; while silica and the oxides and sulphides of arsenic undergo no agglomeration.

A certain number of pulverized salts solidify through pressure and become transparent, thus proving the union of the molecules. At high pressures the hydrated salts, such as sulphate of soda, can be completely liquefied. Various organic substances, such as fatty acids, damp cotton, and starch change their appearance, lose their texture, and consequently undergo considerable molecular change.

The Berlin Sanitary Exhibition.

Preparations for the coming exhibition of sanitary engineering and life-saving appliances in Berlin are going on rapidly. The greater part of the exhibits, especially those which will not bear exposure to the weather, are to be put in the main building, while others will find suitable places in the adjoining halls. The arrangement of the exhibits is a new one. Objects relating to each other will be combined in such a manner that the visitors may understand the purpose and application of each article at one glance. One part of the building represents a battlefield. On the wall is a picture of a battle, and in front of it are set up figures representing ambulances, soldiers, physicians, and attendants, and instruments and apparatus of all kinds relating to the attendance and transportation of wounded soldiers. In another part a public bath in the ancient style is represented with the necessary equipments, to show what progress in the care of public health was made in ancient times as compared with modern. A part of the ground is dug out so as to form a pond, in which diving and other methods of working in and under water are shown with the apparatus on exhibition. As in the case of the Industrial Exhibition of 1879, some of the large arched halls of the city railways are used as exhibition rooms. Some of them will be transformed into mines, to be lighted partly by luminous paint, partly by mine lamps, and partly by electric light, and provided with safety appliances and apparatus for protection against accidents and the like. The town committee of Hamburg intends to exhibit a large model of a steamer, showing a cross section of the same, and fitted up in such a manner that the visitors may enter all parts of the vessel to get a clear and complete notion of the construction of such a vessel with regard to its sanitary contrivances, comfort, and life-saving and preserving apparatus. This new method of arranging the exhibits according to their purposes, so as to show them in the place of their application, will doubtless augment the general interest of the exhibition.

A Panic-Stricken Company.

A new terror has come upon the stockholders in the Keely Motor Company. It isn't the thought that Mr. Keely is a fraud. That is an old idea, and too hopeless for the gentlemen who paid over their money in return for motor stock, knowing a good thing when they saw it, to permit it to form a prominent subject of discussion at their interesting and bewildering meetings. It is not the contemplation of what is, that on the surface troubles the minds of these gentlemen, but a dread of what may be hereafter. What the matter really is we learn partially from the annual report of Mr. Enos T. Throop, of New York, a director in the company.

First, as to the financial condition of the enterprise. In return for the money spent in the past, of course these gentlemen have their experience, which is no doubt very valuable. The present status looks encouraging. The liabilities are only $1,360.75. The resources are 12,000 shares of Keely motor stock, 3,000 shares of the Keely Motor Company's Mexico stock, and cash, $19.48. But while this condition of affairs seems satisfactory for the present, it does not guarantee the future; and, indeed, over this future a dark cloud is hovering. This great invention of Mr. Keely's is not absolutely complete. There is no immediate prospect of its being completed. There are no patents for it, and nobody but Mr. Keely pretends to understand it. He is still groping for the evasive contrivance that will set everything working according to the original expectation; and his mind is scattered over so many inventions that this one cannot receive his constant attention. With these facts before them, the stockholders demand of Mr. Keely either to get out his patents or to explain his invention to some other person. What drives them to this course is shown in the following extract:

"He has repeatedly said that he shall impart this information, and that so soon as he shall bring them to perfection or to that stage determined upon in his own mind. This portion might be conceded by us if a limit could be assigned to his inventive genius; but, considering the nature of the agent he is working with and the grave possibilities of the future, we fear that death or even a worse calamity may overtake him."

Of course, if Mr. Keely dies, all the beautiful machinery required in his experiments, and the well-engraved certificates of stock, will be turned into old iron and waste paper. But the report hints at a worse calamity than death. What can it be? Just listen:

"It is an admitted fact that a mind wholly absorbed in the consideration of one subject becomes weakened. If a fresh mind is brought to his aid, many things which now seem difficult will be found quite easy of solution."

This is it. Mr. Keely's labors may be too much for him. His friends are afraid he will go crazy, and this would be just as bad for his backers as his death. We don't pretend to be expert in such matters, and we never saw Mr. Keely or any of his family; but we hasten to give our opinion, judging from what observations we have made from time to time, about the possibility of Mr. Keely's becoming insane. The machine he originally proposed to construct was a very wonderful and unheard-of-machine, but that does not conclusively prove him a lunatic. He may have been a little jocular when he spoke of it, but not necessarily insane. Moreover, quite apart from the machine, Mr. Keely's conduct from the very beginning exhibits no trace of insanity. We have heard of inventors of so enthusiastic a turn and so engrossed in their inventions as to border on insanity; but it has always been shown by letting the control of a great invention gradually slip away from them, and seeing it profitable to some one else and themselves starving beggars. This does not seem to be the case with Mr. Keely's invention. He has enjoyed a regular salary from the company since it was started, and large sums of money have been placed in his hands, in return for which he has from time to time amused his supporters with curious mechanical entertainments. We cannot say that this shows any evidence of insanity; nor do we believe that he is altogether an idiot when he hesitates to give away the secret of his unfinished invention to anybody else. There are fools in the world, no doubt; there may be some in the Keely Motor Company; but Mr. Keely is not one of them.—*N. Y. Sun.*

Correspondence.

The Vermont Panther.

To the Editor of the Scientific American:

It seems to me not improper that some mention should be made in your columns of the remarkable specimen of puma (*Felis concolor*, L.) which was recently killed in the town of Barnard, Vermont.

We are not surprised at the stories related by our forefathers of hunting wolves, bears, panthers, and other large animals on spots long since thickly settled by man, nor at the strange experiences of the woodsman when his ax was first heard to ring in the primeval forest.

It is not an uncommon thing, indeed, now, for such animals as deer, catamounts, or bears to be shot or trapped in many towns on the northern border of New England; but when a full grown puma, one of the most savage of wild animals on our continent, is taken prowling about the outskirts of a town, in a State which is settled to such an extent as Vermont, we are enabled to realize the condition of the wilderness as it once was, and the nature of those animals with which it was denizened.

The circumstances of this remarkable hunt are as follows:

Some boys, who lived in Barnard, went out after partridges on Thanksgiving Day, November 24, 1881. They soon discovered the fresh tracks of some large animal, and on following a short distance crossed their own path. Being frightened at this circumstance, and also from catching a glimpse of the animal, they hastened back to the house of a neighbor, who soon accompanied them, armed with a shotgun, together with his son, who carried a rifle.

They presently sighted their game, which they chased to a thicket, where it was dislodged several times, but finally shot.

On dragging the animal out, what was at first thought to be a bear proved to be a female panther of the largest size, measuring 7½ feet from tip to tip, and weighing nearly 200 pounds.

It would seem strange at first that the animal was not more savage, that he did not charge his pursuers and kill them at once. This may, however, be partially accounted for from the fact, as afterward appeared, that it had made its supper on two sheep in Pomfret only the night before.

This is the second or third of the species killed in the State since the beginning of the century, and in all probability it will be the last.

The animal was in fine condition, being in its new fur, and showing no signs of having been previously trapped or wounded.

The upper right canine was truncated at about the middle, but this might have been done in a skirmish when the puma was young.

In general the color of the upper parts was tawny-yellow, with a darker wash of the same along the dorsal line, on the tip of the tail, the ears, and face. The whole animal presents in a striking and exaggerated manner the form and features of the ordinary domestic cat. The tail is straight and larger in diameter at the base, the neck short, the ears erect and pocketed. The dentition is precisely similar, the canines being conical, and rising an inch or more from the jaws.

The paws are seven inches wide when the fingers are spread, and conceal a very formidable set of claws.

This pather is supposed to have made the town and vicinity where it was taken its home for seven or eight years, and on several occasions has been seen or heard from.

One hundred and thirty sheep have probably fallen victims to its rapacious maw, as the town records would indicate.

The specimen was embalmed and exhibited in several towns in the State, and I am told a thousand dollars have been offered for its skin.

When mounted it will probably be placed in the State museum at Montpelier.

F. H. H.

Burlington, Vt., December 14, 1881.

A Question for Mr. Lawson to Answer.

To the Editor of the Scientific American:

Some fifteeen years ago I sent to the SCIENTIFIC AMERICAN an account of what, according to the theory promulgated in No. 25, vol. xlv., should have produced a water explosion by its sudden release under steam pressure.

The facts in that case were: that a locomotive with two 8 x 12 cylinders, usually running with steam at 80 to 100 pounds pressure, was going through the woods on a roadway built for logging purposes, and ran under a leaning tree which had fallen since the last trip before made, and the smokestack, safety valve, etc., were knocked clean off. The water spouted forty feet in the air and the boiler was emptied in short order, but there was no explosion. Now, if the "water explosion" theory is correct, why was not there an explosion in this case?

E. H. ROOD.