ability of the weaker ones is increased by the employment of the stronger, and disuse of the weaker ones. In the playing of musical instruments, it is necessary to eliminate inequalities of power, and render the fingers, as nearly as may be, of equal power, without weakening the naturally stronger ones. In other words, the weak fingers should at least be as relatively strong as is natural, while all ought to be much stronger than any would be without a thorough course of education.

It is a fact known to all good teachers that excellence in penmanship—ease and rapidity being assumed as indispensable elements of excellence—is only obtained by first securing a proper position for the hand and arm while holding the pen. All teachers must have observed how difficult of attainment a proper position is with the majority of pupils. One pupil finds it impossible to flex the thumb properly without aiding the feeble muscles, thus called almost for the first time into play, by gripping the pen as though it were to be pinched in two. Another braces the hand by sticking out the third and fourth fingers upon the paper, and almost drops the pen when he attempts to withdraw them; his muscles will not act independently. Others seem to have only the power to open and close the fingers all together, and clutch the pen as though it were a miniature club, with which the fair sheet before them is to be thrashed. Their efforts are absolutely painful to them, and are apt to be uncharitably looked upon by teachers. As well might they be expected to stand upon one foot with ease and comfort as to control the feeble, undisciplined, aching, and trembling muscles, upon which these new and extraordinary demands are made.

A common sense view of this subject suggests that long before the hand grasps a pen, or the fingers touch the keys of a piano, the weak muscles should be gradually strengthened by proper exercise; and while it is not our purpose to specify such a course of exercises, we suggest to those now engaged in promoting physical education in our schools, that they ought to prepare proper exercises designed to meet the requirements of the case. They might easily be adapted to music, and introduced into the schools, and could be practiced by even the youngest, while singing, or with the accompaniment of an instrument.

If proof were wanted of the generally deficient education of the hand, nothing better could be adduced than the fact that, notwithstanding writing is one of the most important and universal of manual operations, it is on the average perhaps the most imperfectly executed. There are many men who can peg shoes, or do fine sewing, or play a violin for many hours together; but there are comparatively few who can write many consecutive letters without great fatigue. On the contrary, the extent to which its powers can be developed is shown in the manipulations of jugglers, and in very many important mechanical operations.

The subject of physical education is now attracting universal attention, and its importance is generally admitted. It has, however, been too exclusively considered in its relation to health, and instruction has been confined principally to the development of the larger muscles of the body and increase of general strength. This is all right so far as it goes, but it ought not to be forgotten that in the emergencies of life the hand plays by far the most important part of all the members, and that to enlarge its powers, is to add directly to the resources of its possessor. If legs are lost, skillful hands can supply partial substitutes. If eyes are extinguished, the hand if educated can still supply the physical necessities of the blind. If hearing fails, the hands replace spoken language by an inferior but intelligible language of signs, but if the hands are lost what can in any measure compensate for this overwhelming calamity? The feet can only in a measure take the place of hands after many years of practice, and immunity from the severe labor of walking; and it is very doubtful whether any adult could ever succeed in making toes do the work of fingers, although children born without arms have been known to do so.

What excuse can there be then, for neglecting the early and careful instruction of *both* hands. We are not speaking of an impracticable thing when we say it is possible to rear children so that whatever one hand can do the other may do equally well. We know this has been accomplished in many notable instances, where the disability of the left hand has been rectified, in spite of all obstacles arising from bad habits acquired in childhood. We have seen surgeons transfer an instrument from one hand to the other during an operation whenever convenience required it, without the least awkwardness. We have seen draftsmen using both hands in coloring drawings, an immense advantage both to rapidity of work and evenness of shading. We have seen woodmen chop timber "right or left handed," and one carpenter who used a hammer or saw with either hand with nearly equal facility. In all these cases, the use of the left hand in common with the right gave very much greater efficiency.

We have seen many instances of children whose parents were foreigners, growing up among children of American birth, and speaking the language of their parents, or of their playmates with equal facility, and we are confident that the two languages are acquired in such cases as easily as one would be. The same ease would undoubtedly attend the learning to use either hand for all necessary manipulations, so that no fear that both would become awkward need be apprehended.

Thus the resources of those dependent upon manual labor for subsistence would be nearly doubled, much time and expense would be saved in the acquirement of arts specially requiring the employment of the left band, and the superior grace and dignity attending complete and symmetrical development would be in a much larger measure attained.

Much more might be said in regard to the education of the hand, but as this article is only intended to arouse the attention of thinking people to a radical defect in physical education, we may appropriately close our remarks with the following quotation from that admirable poem "The Hand and its Work," by Mrs. Hale.

"All wants that from our nature rise,
Life's common cares, the hand supplies
It tends and clothes our myriad race,
And forms for each a resting place;
And ceaseless ministry doth keep
From cradle dream to coffin sleep."

## DEPRESSION IN AMERICAN COMMERCE.

The present depression and decline in American commerce has had few parallels. So marked has this depression become, that scarcely any investment can be made with a leaner promise of profit than a purchase of shipping. Under this state of affairs a special Congress committee are engaged in trying to discover the causes for the decline, and if possible to apply a remedy.

To this end a session was held by the committee in New York, ending Saturday the 16th October, in which a number of gentlemen, prominent in commercial circles, were examined.

The general causes of the existing depression as elicited from these gentlemen, may be enumerated as follows:

First, high prices of labor and materials.

Second, depreciation in our currency.

Third, increased cost of sailing our vessels after they are built, consequent upon injudicious taxation, as well as high prices.

Fourth, the subsidizing policy of England which gives her commerce great advantages not enjoyed by our shipowners.

Fifth, the substitution of iron and steel vessels, in the building of which we cannot, under existing circumstances, compete with England.

Sixth, the high duties on shipbuilding materials.

In relation to the first four causes enumerated we cannot do better than to quote from the testimony of Mr. A. A. Low:

"Most of our laws are framed with a view to protect our various industries, but the laws which generally protect our interests bear pretty heavy upon this special interest. They are really a burden upon our shipping interest."

"By the Chairman.—We would like to have you give your views on the causes that have operated to produce this effect upon our commerce." "We have high-priced labor and material which enter into the construction of a ship, and we have a depreciated currency. We have the increased cost of the ship in the first instance and also the increased cost of sailing the ship after she is built. I think the American shipping interest had suffered before the war. The California trade had caused the building of high-priced ships, and in large numbers, and the traffic in that direction soon proved unremunerative. The war came on, and the privateers burned our vessels. Insurance could not be obtained, and these combined drove our commerce from the ocean. My own belief is that the policy of England in subsidizing lines of steamers to various ports of the world, has given her a prestige almost insuperable.

"We have just now one important steam line, and its property has been greatly injured since the completion of the Pacific Railroad. We have given $60,000,000 to a railroad, together with lands, and, out of all support from the Pacific Mail lines, I suppose we have suffered an injury of six or eight millions of dollars.

"The capital of the line two years ago was $20,000,000; now it is $6,000,000. It would have been just as good now if it had not been that Congress had given money to the railroad. There does not seem to be a law on the statute book that does not seem to inflict an injury. Then the policy of England is perfect. They are a nation of large supplies; they have manufactories in abundance to supply the distant markets; their colonial policy is excellent, and all their laws are in the interests of commerce. Our opportunities here for the employment of commerce are so great that our Legislature has not given them that advantage. I think they have acted wisely in subsidizing their lines. It is easier to tell the causes of the depression than to find the remedy. If subsidies could be given to ocean iron steamers, it would be an offset to the extra cost of building them. My own impression has been that large subsidies should be given. These subsidies, while they cost the Government largely in the beginning, cost nothing in the end."

Mr. Low also explained that the English Government allow all their steamers to receive their supplies from bonded warehouses, while American shipowners are obliged to pay duties on their supplies.

Mr. George Opdyke, ex-Mayor of New York city, a gentleman of acknowledged ability on all subjects connected with political economy, gave more prominence to the fifth and sixth causes above specified, but dwelt mainly upon the depreciation of our currency. He maintained that everything is about 75 per cent higher than under the old currency. The American shipbuilder has, therefore, to pay a difference of 75 per cent over the foreign shipbuilder. He thought it would be very many years before we can build ships of iron as cheaply as they can be built in Europe. As long as protection is the policy in this country we cannot expect them to make an exception in this regard. If we should adopt the policy of free trade, shipbuilding would increase. Subsidizing is another remedy. While he was opposed to all government subsidies, it would seem essential that we should try to control commerce, and that, to some extent, our Government should follow the policy of Great Britain. How far that policy should go, he was not prepared to say. He was opposed to it altogether, but from the present crippled condition of our commerce we desire to regain the position that we once held, and he believed that it would be judicious for the Government in proper cases where lines are established between this and other important countries, to meet Great Britain with her own weapons.

The question arises, Can these causes be removed without great and permanent injury to other industries? We believe they can. A sound protective policy does not merely imply indiscriminate imposition of duties; and if the burdens of shipowners are too great they should be lessened. Subsidies and drawbacks are protection in the most ultra meaning of the term. Permission to take supplies from bonded warehouses is only another form of protection. England protects her commerce; always has protected it. Let us now protect ours by the same means she employs, and, as Mr. Opdyke recommends, turn her own weapons against her.

## CLOSE OF THE FAIR OF THE AMERICAN INSTITUTE.

It is officially announced that the Fair of the American Institute will positively close on the 30th of October.

The managers may congratulate themselves upon the success of the exhibition. It has been well attended, and has generally, we believe, satisfied both exhibitors and visitors.

A common remark of narrow-minded people is, that such exhibitions are mere advertising dodges, got up for the special benefit of the exhibitors, that there is really very little that is new exhibited, and that it does not pay to visit them. Yet these same narrow-minded people are to be found annually in attendance at such displays, finding, it is to be supposed, sufficient pleasure in grumbling to compensate for a trifling expenditure of money and time.

There is very little novelty to be expected in any such display in proportion to the large number of things exhibited. The world never gets on so fast as to satisfy those to whom it owes nothing. No class of men work harder to benefit their fellows than inventors, and yet those croakers who never had an original idea in their brains, and never would have should they live to the world's end, find fault at the slowness of mechanical progress.

These people will spend an evening strolling up Broadway, gazing in at the shop windows at the beautiful things displayed, and never think of finding fault that these things are placed in the windows to advertise them; yet, at one of these fairs where a collection of curious, instructive, and beautiful articles and machines is brought together, such as they could not see in a week of strolling and gaping at windows, they make complaint because the exhibitors are likely to reap some pecuniary benefit. Of course they are; and if you who grumble object to this sort of thing, you are welcome to stay away, a thing which you cannot do, for it is a characteristic of such people to be found in every place where their growling can mar the pleasure of others.

For ourselves, we are satisfied to see the gradual improvement made in old and standard manufactures, and do not complain that it is only now and then anything meets our eye that can be called a "novelty." It is this gradual improvement that makes up the bulk of human progress.

We have, in our notices of various departments, already called attention to the most noteworthy improvements exhibited. We have, doubtless, overlooked some, although it was our intention to treat impartially all exhibitors of important improvements. Some of the departments not calculated to greatly interest our readers, we have not specially mentioned at all. Those, however, who have followed us in our weekly notices will own that we have dealt very liberally indeed with exhibitors, and we have received ample assurances that the exhibitors themselves so regard it.

We shall now discontinue these notices, with the hope that the future exhibitions of the American Institute may be as successful as this has been, and with the heartiest wishes for the success of such of the exhibitors as are endeavoring through the facilities thus afforded, to introduce new inventions. Many of these will date the commencement of success from the Exhibition of the American Institute for 1869.

### A Perilous Balloon Voyage.

The Saginaw (Michigan), *Enterprise*, relates the story of one of the most perilous balloon voyages on record. Professor La Mountain was the only occupant of the balloon, which ascended from Bay City on the afternoon of the 12th instant. The balloon had leaked badly, and his companion was obliged to get out of the car, when those who held the balloon let go suddenly, and the air vessel passed upward with dreadful velocity, without either ballast, instruments, food, or companion. In a few minutes the balloon had attained an altitude of two miles, and was driven by a very strong gale directly towards the lake. It passed into a snow cloud, which speedily coated it and everything in and about it. The escape valve was frozen tight, and Professor La Mountain, in pulling with all his might to open it, drew out the rope and thus cut off another means of escape. The balloon still passed upward, and emerged into the clear cold air above. The involuntary traveler felt that something must be done, and quickly. He climbed the ropes above the hoop and felt for his knife, but he had left it below. Clinging with one hand to the ropes, he tore with his other hand and his teeth a hole in the side of the balloon. Passing to the other side he repeated the process and then returned quickly to the car. His fingers had been frozen while thus exposed. He heard the cloth tear and saw the rent open from the bottom to the top. The balloon had gradually slackened its upward progress, rested a moment in equilibrium, and then began to descend, slowly at first and then with a velocity more frightful than that of the ascent. At the hight of two miles from the ground the gas had completely left the balloon, but the air

had rushed in and made it a sort of parachute. Professor La Mountain was in a half unconscious state during the descent, although he remembers passing through the cloud, less distinctly the sensation on seeing and nearing the earth, and then he became wholly unconscious. When his senses returned he was lying in a wood, and several persons had come to his assistance, having seen him fall. He had been stunned and severely bruised, but had broken no bones, and suffered no internal injury. The spot where he landed was seven miles from Bay City ; the time he had been in the air is not stated.

### Bells and Carillons, or Continental Chimes.

Mr. Thomas Walesby communicates to the *Builder* an interesting article on bells. He says :

" Our great musical historian, Dr. Charles Burney, in his interesting work, 'The present State of Music in Germany, the Netherlands,' etc. London, 1773, speaking of his visit to Courtray, says :

" 'It was in this town that I first perceived the passion for *carillons*, or chimes, which is so prevalent throughout the Netherlands. I happened to arrive at eleven o'clock, and half an hour after the chimes played a great number of cheerful tunes, in different keys, which awakened my curiosity for this species of music so much, that, when I came to Ghent, I determined to inform myself, in a particular manner, concerning the *carillon* science. For this purpose I mounted the town belfry, from whence I had a full view, not only of the city of Ghent, but could examine the mechanism of the chimes, as far as they are played by clock-work, and likewise see the *carillonneur* perform with a kind of keys. communicating with the bells, as those of the harpsichord and organ do with strings and pipes. * * * * * *
The great convenience of this kind of music is, that it entertains the inhabitants of a whole town without giving them the trouble of going to any particular spot to hear it.'

" So far so good. The respected author then goes on to say—

" 'But the want of something to stop the vibration of each bell, at the pleasure of the player, like the valves of an organ, is an intolerable defect to a cultivated ear ; for by the notes of one passage perpetually running into another, everything is rendered so inarticulate and confused, as to occasion a very disagreeable jargon.'

" Now, having myself examined the bells and mechanism —*cylindre et clavier*— of the most celebrated *carillons* in Europe, and repeatedly listened to their music at various distances, I beg to assert most distinctly that the statement made by the learned doctor in the last paragraph is false. I deny that 'everything is rendered inarticulate and confused,' or disagreeable. On this point I speak the more plainly, because almost every Englishman who has written a line about *carillons* since 1773, has followed Burney's dictum, and told us that the great defect is the want of a damper to each bell. Several examples relating to Boston and other chimes have been contributed to public journals since Christmas last.

" Perhaps the following observations may suggest what led the Doctor to entertain and publish the notion just mentioned :

" Every musician worthy of the name knows that instruments strung with wire 'which have nothing to stop the sounding-strings, make an intolerable jangle to one that stands near,' as, I may add, bells do to one that is *in the bell chamber*, and hears the continuing sound of dissonant tones. Such an instrument of the wire-string kind is the dulcimer. But the piano-forte has a simple contrivance—a damper—for stopping the vibrations of the strings when the fingers are lifted from the keys.

" If, then, instead of going to a spot at some convenient distance from the tower, as he ought to have done, with a view to 'inform himself in a *particular* manner' concerning *carillon music*, Dr. Burney stood *in the bell chamber* during a performance, the effect must indeed have been intolerable to a cultivated ear.

" I maintain, however, that musical bells suspended in a tower, require no damper whatever ; for, when their sounds have issued from the openings in the sides of the building, they spread themselves in the air, and ultimately reach the auditor with precision in subdued and pleasing tones. Even rapid passages in *carillon* music, if properly harmonized so as not to weaken or confuse the melody, and executed by, or upon, a good instrument, produce an admirable effect.

" It would be well if the vibrations of many noisy and discordant things called bells were completely stopped. But to say that musical tower bells require dampers in order to produce the desired effect is truly absurd. It is equal to any of the 'moonshine' on bells in general with which we have been favored during the last fourteen years."

### Convenient Method of Ascertaining the Constitution of Flames.

M. Dufour recommends the following process for demonstrating, for instance, that the flame of a candle is formed of a hollow cone, luminous on the outside only, and dark in the interior. For this purpose it is necessary to cut the flame ; the most preferable method of doing this is by means of a sheet of water or air. The arrangement is as follows: A caoutchouc tube has, at one of its extremities, a gas jet, such as is used for common gas flames ; this jet has an almost semicircular slit of 0·4m.m. in depth. The other end of the tube communicates with a reservoir of water placed at a convenient hight. Upon a suitable pressure, the water flows out by the slit in the jet, producing a clear sheet, capable of preserving for a sufficient length of time, an invariable form and size. The slit is placed in such a manner that the sheet presents a horizontal surface ; and this will easily cut the flame of a candle, showing a perfect section. The hot gases and carbonaceous particles are carried off by the water. On placing the eye above the hollow cone, the luminous wall, etc., can be distinctly seen. Sections may easily be made near the wick or near the point ; nothing hinders observation, which may be prolonged at pleasure, and a lens may be used if desired. A flame of gas may be cut and examined in the same manner, but the current of gas must not be strong enough to traverse the sheet of water. If a current of air be caused to come out of the slit by bellows, an invisible sheet of air is formed which is, also, very convenient for making a section of flame. Close observation is quite possible ; for the aërial current prevents the heated gases from reaching the eyes, and a lens may be used, as in the former case. The flame forms a cone, whose luminous walls are extremely thin, and their interior can be plainly seen. A platinum wire may be introduced across the section ; and on being plunged as far as the wick, it will remain unreddened in the dark interior of the cone.

A jet of gas issuing from a circular opening. of from 1 to 2m.m. in diameter, may also be cut very conveniently by the sheet of air. It will be seen to consist of a cone whose walls are brilliant and extremely thin. Upon bringing the sheet of air close to the aperture whence the gas escapes, the flame will be divided at its base and will reappear a little higher. By this means, the entire length of the luminous cone, its thin walls, and their interior may be examined.

If a jet of gas produced by a fan-tail burner be cut, the luminous fan will be found to consist of two brilliant blades, between which there is a narrow obscure space. The blades are at a greater distance apart, and the dark space is wider towards the end of the fan-tails ; and, by assuming a suitable position, it is easy to see through the section of flame into the dark space which separates the brilliant walls, and at the end of this will be seen the slit by which the gas escapes.

Instead of throwing the sheet of air perpendicularly to the flame, M. Dufour thinks it better to throw it partly on one side, on such a plane as to make a slight angle with the axis of the conical flame, or with the plane of the fan shaped flame. A lateral suction is then produced by the influence of the current, which draws the flame, and inclines it against the sheet of air, by which it is cut. By placing the sheet of air on a more or less inclined plane, and approaching or removing it from the base of the flame, the section is easily made at points more or less distant from that base.

The method described above may, of course, be applied to any kind of flame. M. Dufour suggests that it might be of service in the chemical analysis of flames. When a flame is cut by a sheet of water, the water draws off the gases of which it is composed. If the section be made with a sheet of air, it will be easy, by placing suction pipes through the length, and ending at fixed points in the interior of the cone, to collect the gases whose composition is desired to be ascertained. —*Les Mondes.*

### The Mound Builders in the Rocky Mountains.

An account was recently given of the opening of an ancient mound in Southern Utah, similar to those of the Mississippi Valley, in which were found relics of the unknown builders indicating much artistic skill. It was stated that this was the first evidence found of the existence of the Mound Builders west of the Rocky Mountains. We are now able to announce, for the first time, as we suppose, the discovery of similar mounds, evidently built by the same race, high up on the Rocky Mountains. The discovery was made by Mr. C. A. Deane, of Denver, while at work on a Government survey, in the mountains, a few weeks since. He found upon the extreme summit of the snowy range,structures of stone evidently of ancient origin, and hitherto unknow or unnoticed. Opposite to and also north of the head of South Boulder Creek, and on the summit of the range, Mr. Deane and his party observed large numbers of the granite rocks, many of them as large as two men could lift, in a position that could not have been the result of chance. They had evidently been, placed upright in a line, conforming to the general contour of the dividing ridge, and frequently extending in an unbroken line for one or two hundred yards. Many of the stones have fallen over or are leaning, while others retain their upright position. In two places, connected with this line, are mounds of stone, loosely laid up, about two feet in hight, and embracing a circular area of about ten feet in diameter. The stones were evidently collected on the spot, as the surface is cleared for a space of several yards around the structures. These lines and mounds of stone bear every mark of extreme antiquity, as the disintegrated granite has accumulated to a considerable depth at their base, and the rocks in the mounds are moss-grown. The feature, more particularly identifying these structures with those of the Mound Builders elsewhere, is that they present, at intervals, projections pointing to the westward. We are thus particular in the description of these Rocky Mountain mounds which are extraordinary in position if not in character, in the hope that antiquarians, visiting our Territory, may be induced to examine them. It would not involve much labor to open them and possibly they cover relics that may add something to our small stock of knowledge of the ancient race who constructed these and similar works all over the continent. The walls and mounds are situated 3,000 feet above the timber line. It is, therefore, hardly supposable that they were built for altars of sacrifice. They were not large enough for shelter or defense. The more probable supposition is, that like the larger mounds elsewhere, they were places of sepulture, and perhaps, also, at the same time, historical memorials, pointing, with their stone fingers, in the direction of the country from which the builders, or their ancestors, migrated. The three mounds may mark the resting places of those who, for some distinction, were buried as near to heaven as possible.—*Rocky Mountain News.*

### Steam Plowing.

We learn from the *Engineer* that a highly interesting test of steam apparatus for cultivating and plowing the soil was carried out recently at Eye, near Peterborough, England. The object on this occasion was two-fold, viz., to introduce an improved self-acting anchor for using with the round-about system, and to show what could be done with more powerful machinery and direct action by the use of two engines. The latter system was exhibited by Messrs. Fowler and Co., of Leeds.

The new application referred to was invented by Mr. Champion, a practical farmer near Shalding. It consists in what we may term a self-acting anchor. The form of the invention is simply a cross-bar in which are fixed spikes or claws for entering the ground. There are two or three spikes fastened by clasps on each side of the square iron bar, according as the soil may be, hard or soft, and more or less resistance is required. The iron bar which carries these spikes is placed across the back part of Messrs. Fowler and Co.'s disk anchor and outside the frame, attached to the revolving bar, is a ratchet with four catches, into which falls the stop notch of a lever. The distance, therefore, which the anchor advances depends on the square and the length of the spikes and the size of the ratchet. The one shown at work on this occasion was so constructed that the anchor advanced three feet each time the lever was raised, and the ratchet turned round one fourth of its circle or side. When a plow or digger, however, has four breasts or "diggers" on it, and more than three feet of work is done at a drag, the anchor does not advance sufficiently far if the ratchet is allowed to turn only one fourth round. Every three or four drags, therefore, which the plow takes, it is allowed to turn half round, which keeps it in the right position for a direct action of the rope. But this is a matter of minor detail.

The result of this application is, the claw anchors, which required a man at each end to shift and keep in their place, are entirely dispensed with, and three men and two boys, viz., one man at the engine, one at the windlass, and one on the plow, with the two boys at the rope-porters, can now do the work more easily than the five men and two boys previously required, could do. An important difference in the cost on first outlay is also the result of this system.

The anchor is undoubtedly the most simple and efficient that has yet been introduced. It will bear a strain of 20-horse power, and it has never been turned over; while in hard ground the claw anchors are difficult to insert, and in soft ground it is next to impossible to keep them in a proper position.

In this method of plowing, clip-drum engines are placed at each end of the field, and the gang of plows is drawn backward and forward by a wire rope. Results, therefore, need only now be given. Here almost a revolution is just now occurring. The small 10-horse engines are being replaced by 30-horse engines, and for the superior work and greater economy of this increased power it has been satisfactorily calculated that 50-horse engines will be even more efficient. By 30-horse engines and thirteen-tined cultivators an average of thirty-six acres per day has been accomplished, the cost of which is actually 2s. 6d. per acre. The calculation mentioned with regard to the 50-horse engines is that the cost can thereby be reduced to 1s. 6d. or 1s. per acre at a depth of 10 inches.

The practical experience which has led to these conclusions has occurred at Buscote Park, Berks. Mr. Campbell has there worked since harvest the 30-horse engines, weighing twenty-eight tuns each, which we saw at the royal meeting at Manchester. He has done between two thousand and three thousand acres at the actual cost named—2s. 6d. per acre—his land being of the strongest and heaviest kind. The rate at which he works is from three and a half to four miles per hour, at which pace from three to four acres are broken up in the same time. The increased efficiency, too, of the work done by this greater power is greatly due to the increased pace which it permits, for not only is the soil smashed up, but it is shattered at the same time.

The work done with the 10-horse engine and cultivator was perfection itself. Nothing could be better at the depth of 10 inches. Between 7 A. M. and 2·30 P. M. eighteen acres were done in the way described.



## APPLICATIONS FOR EXTENSION OF PATENTS.

MACHINE FOR HEADING BOLTS.—William S. Booth, of New Britain, Conn. administrator of the estate of H. M. Clark, deceased, has petitioned for an extension of the above patent. Day of hearing, December 29, 1869.

MEANS FOR REGULATING AND WORKING STEAM VALVES AS CUT-OFFS.—Charles H. Brown and Charles Burleigh, of Fitchburg, Mass., have applied for an extension of the above patent. Day of hearing December 29, 1869.

MAKING CLOTHES PINS.—Ephraim Parker, of Marlow, N.H., has petitioned for the extension of the above patent. Day of hearing, December 29, 1869.

LUBRICATOR.—William Gee, of New York city, has applied for an extension of the above patent. Day of hearing, January 24, 1870.

SPREADING ROLLERS FOR STRETCHING CLOTH.—Jonathan I. Hillard, of Fall River, Mass., has applied for an extension of the above patent. Day of hearing March 28, 1870.

SHINGLE MACHINE.—Edward Hedley, of Philadelphia, Pa., has applied for an extension of the above patent. Day of hearing May 2, 1870.