Improved Feed Cutter.

The combination of devices, shown in the annexed engraving, renders the machine illustrated a most efficient, as well as simple and durable, implement. We have seldom met with an agricultural machine which seemed, in all respects, more adapted to the purpose it was intended to subserve. The feed cutter is a machine that should be on every farm, and the inventor of the one we are about to describe has evidently comprehended the requirements of farmers in this respect. The feeding apparatus is one of the principal features of the invention. Its operation is as follows:

A lug, A, is attached to the knife plate. As this plate is actuated by the hand in cutting the forage, the lug lifts the end of a pivoted bar, B. To the bar, B, is pivoted a ratchet bar, C. This bar is bent at right angles and toothed, as shown, so that the teeth of one end engage the upp r ratchet wheel, D, and the lower teeth actuate the lower ratchet wheel. These wheels are respectively attached to the feed rolls. The effect of this arrangement is, that the operator can gage his feed exactly as he wants it while cutting, the amount of feed being regulated by, and depending upon, the motion of the knife plate. The higher the latter is lifted, the greater will be the feed, and *vice versâ*.

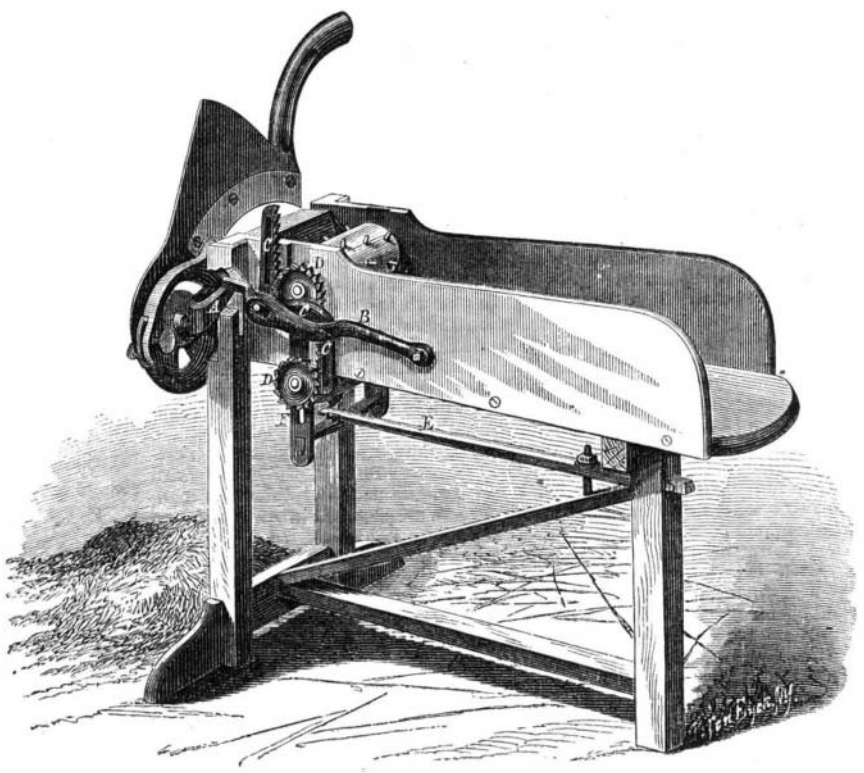
The upper feed roller is held down upon the hay or other material to be cut, by means of a wooden spring, E, which acts through a crosshead and vertical bars, F.

The feed rollers are furnished with suitable blades and points with which to grasp and carry forward the materials to be cut, and also to hold them firmly so that they will not be drawn out of place by the pressure of the cutting knife.

The cutter bar, at the point where it is pivoted to the fulcrum, is compressed between an armed washer of large size secured by a nut, and a friction compress tightened by a thumb screw, so as to force the knife always to move close to the face plate, allowing no chance for it to spring off from the substance to be cut.

The advantages gained, in addition to those already stated, are, a broad guide plate for the knife; the closeness with which the knife holds itself to the face plate; and the automatic feed arrangement, by which the danger and labor of feeding by the hand of the operator is avoided.

The machine is covered by two patents, obtained through the Scientific American Patent Agency, dated respectively Dec. 1, 1869, and Nov. 15, 1870. Address the patentee, G. S. Garth, for territorial rights and further information, at Mill Hall, Clinton Co., Pa. Pa., Md., and D. C., are not for sale.



GARTH'S FEED CUTTER.

RE-VACCINATION--GLYCERIN LYMPH.

The great prevalence of smallpox in Europe and this country, at the present time, has led to a re-examination of the statistics of vaccination. It has been found that no re-vaccinated person has been admitted into the London hospitals, a fact which speaks volumes in favor of the practice.

Another peculiarity is now recognized, and that is, that vaccination previous to the age of puberty cannot be relied upon as a protection afterward, and that therefore children should be re-vaccinated when they have passed the boundary between childhood and adult age.

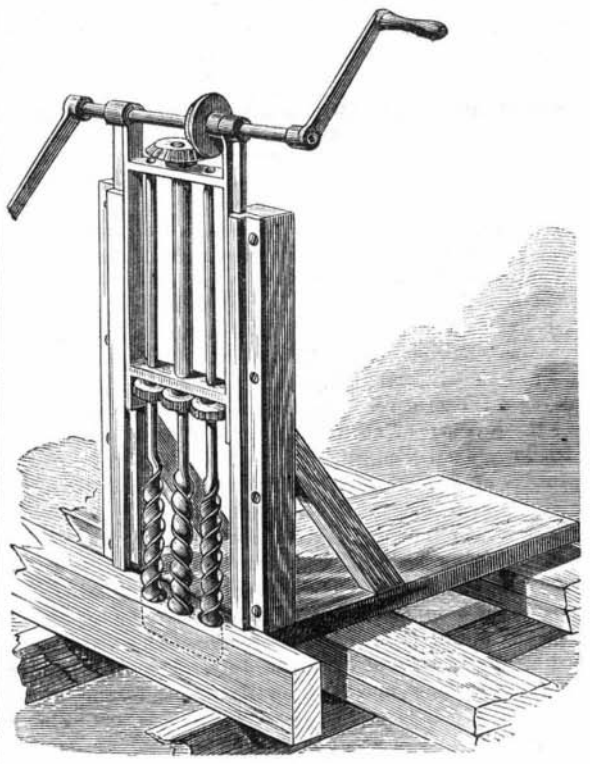
Prussia is avowedly the country where regular re-vaccination is most generally practised, the law making the precaution obligatory on every person, and the authorities conscientiously watching over its performance. As a natural result cases of small pox are very rare. It has, however been objected, there as here, that lymph is scarce. To make the most of such lymph as there is, Government has tried its application when mixed with glycerin, and the result was so successful as to lead to a public recommendation of the mixture to official vaccinating surgeons. The manner in which the glycerin lymph is prepared is thus described by the *Reichsanzeiger:* The pustules of a healthy vaccinated person are opened with a needle, and the effluent matter carefully removed by means of a lancet, the same instrument being gently applied to assist the efflux. The lymph is then best placed in the hollow of a watch glass, and there is mixed with twice its quantity of chemically pure glycerin and as much distilled water. The liquids are thoroughly well mixed with a paint brush. The mixture may be preserved for use in capillary tubes or small medicine glasses. The lymph thus procured is considered equal in effect to pure lymph; care must, however, be taken to shake it before use. As the same quantity that now suffices for one is thus made to suffice for five, the discovery ought to be extremely useful in crowded cities like ours.

Electrotypy---Imitation of Leather.

There is not a doubt but that this is an age of imitations; and the sham is so often taken for the real that even judges themselves have been misled. In manufactures there is such a constant demand for something new that the best energies are severely taxed to meet the requirements of the hour, and it is surprising to many how promptly this craving is satisfied. As an instance of the extending power of the imitator's art, we have noticed that Messrs. Elkington and Co., of Birmingham, have arranged to produce, by the electrotype process, imitations of the choicest grains of leather. They say that the system of producing leathers in exact facsimile of morocco, seal, and other skins, by means of electro deposited copper rollers, has now become an established branch of leather manufacture. The fine grain of the most rare and valuable skins can by this process be reproduced at a merely fractional cost, as compared with the ordinary inferior imitations. The system may be briefly described as follows: An ordinary machine roller is fitted with a mandrel, upon which is deposited, by a new process, the copper facsimile. The latter is an exact copy of any rare or choice skin required to be reproduced, and it is only by a recent improvement in electrotyping that the difficulty of depositing from such a substance as leather has been surmounted. An ordinary skin can thus be impressed with the beautiful surface of morocco skin, even to the finest variations of grain, and several thousand may be copied by one deposit. In all cases the actual skin required to be copied must be sent. These rollers are supplied ready for the machine; or, if preferred, manufacturers may send their own mandrels and have the facsimile deposited thereon.

BORING AND MORTISING MACHINE.

Our engraving is a good representation of a boring and mortising machine, invented by Arthur O'Neal, of Hyde Park, Mass. As will be seen, it is simply the adaptation of an old principle to driving a gang of augers instead of a single one. The power is first transmitted to the central auger, and from its shaft to the others by means of gearing, the two outside ones having their twist and cutting edges in the opposite direction from the middle one.



Tremendous Earthquake in China.

The neighborhood of Bathang, in the district of Sechuen, the central western province of China, has been devastated by one of the most appalling earthquakes of modern times. On April 4th, the earth trembled so much that houses and public buildings were thrown down and destroyed. Volcanic fire burst forth from fissures in the ground, and tempests of wind increased the destructive power of the flames. The subterranean thunder continued to be heard for three days, and the whole district was rocked like a vessel at sea. The disturbance lasted for ten days, after which the motion subsided. Besides large public buildings, a temple containing 350 rooms, and six smaller ones, as well as nearly 2,000 houses, were utterly broken in pieces. The deaths are known to amount to 2,398 people. The influence took a circular direction, and covered 400 miles of ground. Our readers will understand the effect of this visitation on such a people as the Chinese, whose superstition and credulity are proverbial.

THE GOVERNMENT OF NEW YORK CITY.

The rapidity of the growth of population and wealth in New York city naturally makes its inhabitants anxious that its administration be conducted in the best, wisest, and most economical manner. All Americans are proud of the Empire City, and we natives especially hope to see it the best governed city in the United States.

Of the importance of the city, and the magnitude of its interests, the annual message of the Mayor, just published, gives us opportunity for judging. The population is declared to be 942,252 souls, the amount of property, real and personal, valued for taxation is $1,075,000,000, and the taxes for the year, $23,300,000. The imports fromother countries amounted to over $300,000,000, and the customs duties collected to over $140,000,000. The exports from the port of New York were about $300,000,000. These are imposing figures, showing that the commercial interests of New York will alone suffice to place the United States high in the category of nations.

For the comfort and well being of its vast population, 460 miles of streets, 340 miles of water pipes, and 275 miles of sewers, have been constructed; 19,000 gas lamps have been erected; and nearly 1,300 cars and omnibuses, and 94,000 carriages, licensed and private, traverse the streets daily.

The area of New York city comprises about 22 square miles, with a frontage to the Hudson and East Rivers of 29 miles. Of the necessity for the reconstruction of the whole water frontage, we have spoken at length in a recent article, as well as of the plans under consideration, and the manner of carrying them out. In respect to public improvements generally, the Mayor states that the city could be liberally ornamented and beautified, as well as rendered more subservient to the public convenience, by an expenditure of $20,000,000 during the next three years. and that the increased value of property would lighten the pressure of taxation by better distribution of its incidence. The property belonging to the city is stated at $267,000,000, while the outstanding debt is only about $80,000,000. There is no wonder, then, that the savings banks and other monetary institutions in search of unquestionable investments, which are accustomed to prefer securities that are backed by real estate, invest largely in bonds of the City of New York.

The Marks from Small Pox.

The painful and malignant disease, which has lately, thanks to uncleanliness and the disregard of the most ordinary precautions for the preservation of health, made such a change in the bills of mortality in this country and in Europe, calls to mind several of the remedies which are reputed to have the virtue of preventing the disfiguration of the skin. Among others, the *Sarracenia purpurea* was introduced into England. This plant is familiar to the natives of South Carolina, and is used by them internally, in the form of infusion, or decoction, for the cure of the same disease. It is a tonic, slightly stimulating, and is useful in cases of dyspepsia, waterbrash, and abdominal distension. There is another, well known in India, the leaves of which are used by the natives to cover the bodies of sufferers for the above mentioned purpose. Dr. Wright says that "the leaves, beaten into a pulp and externally applied, act like a charm in removing the most intractable form of psora and other pustular eruptions." This plant is the *Melia Azadir-achta* of Linnæus, and is called *pride of India, pride of China,* or *bead tree.* It is found, also, in our Southern States. It is, when taken internally, cathartic, emetic, and a powerful vermifuge; but its use, as described by Dr. Wright, does not appear to be known in this country. We look with interest for the results of experiments with it for the purpose of lessening the terrors of small pox.

SINGER'S SEWING MACHINE IN ENGLAND.—Arrangements have been made for the extension on a large scale of the Singer Sewing Machine Company's manufactory in James street, Bridgeton. Building operations have already been commenced, and the additions contemplated will give about 25,000 square feet of extra floorage, thus affording employment to 300 additional hands. The new premises are expected to be finished and ready for occupation by August. The factory will then be capable of turning out fully 1,400 machines per week, being nearly double the present average production; while the total number of hands employed will be very little short of 1,000. These extensions will necessarily involve a large addition to the existing plant, and a lot of new machinery is about to be introduced for the medium or No. 1 machine. It is said that the Singer machine factory at Bridgeton is now the largest in the United Kingdom, and, in its enlarged form, it will compare favorably with some of the colossal establishments on the other side of the Atlantic. —*Engineering.*

Scientific American.

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VOL. XXIV., NO. 26 . . . [NEW SERIES.] *Twenty-sixth Year.*

NEW YORK, SATURDAY, JUNE 24, 1871.

Contents:

(Illustrated articles are marked with an asterisk.)

The present issue of the SCIENTIFIC AMERICAN closes the first volume of 1871.

Subscribers who commenced with the volume, and paid for half a year, are reminded that the time for which they prepaid will expire with this number. We hope every one of these six month subscribers will renew before the 1st of July.

The safest way to remit is by draft on New York, postal order, or check on some bank, although money is seldom lost when secured in letter and properly directed. Address MUNN & CO., Box 773, New York.

CLOSE OF ANOTHER VOLUME.

The present number completes the Twenty-fourth Volume of the New Series of the SCIENTIFIC AMERICAN.

As we write, our subscription list is larger than at any other period in the history of our popular journal, and it is still growing steadily and healthfully, without any special exertion on our part, except that always made to render our paper the best popular scientific publication in the world.

By comparing the index of the present volume with those of preceding volumes, it will be seen that a considerably greater variety of subjects has been discussed than in any other volume. We have labored earnestly to please and instruct our readers in the selection of topics as well as in their treatment, and we have every reason to believe we have succeeded.

The hearty friendship to our enterprise, evidenced in the warm praises received from our numerous correspondents, encourages us again to appeal to our readers for their cooperation in extending the usefulness of the SCIENTIFIC AMERICAN, by inducing others to subscribe for it. While our paper is, we believe, the best of its class, we know it to be the cheapest; and no man can invest money more profitably than in securing such a fund of practical and useful information as we annually furnish.

The departments of "Queries," and "Answers to Correspondents," is, under the present plan of conducting it, eliciting a large amount of practical information upon the whole range of industrial arts. We hope our correspondents will continue their favors and aid us in ultimately making this one of the most valuable features of our paper.

With these remarks we pass on to the next volume, pledging that our efforts shall be put forth unremittingly to maintain and increase the value of the SCIENTIFIC AMERICAN and to sustain its reputation.

THE LAST SIX MONTHS OF CHEMISTRY.

In turning over the leaves of our last volume, to see what has been done in the line of chemistry, we do not come across the record of any startling discoveries, but we find a very satisfactory condition of things in the various laboratories of the world, and there is abundant proof of unusual industry among scientific men. It is pleasant to see that the ranks of scientific laborers have not been so largely thinned by death as they were a year ago. Very few men of distinction have been summoned away during the last six months, and the biographical sketches of these few have found suitable place in our columns. Conspicuous among those who have closed their labors may be mentioned Professor Wetherill, William von Haidinger, and Professor Staedeler.

The efforts of chemists have been chiefly directed towards increasing our knowledge of the properties of substances previously discovered. This is in accordance with the humanitarian spirit of the age. The tendency now always is to make practical use of everything—in other words, to turn it to good account—and in this pursuit the chemists have been unusually successful since the commencement of the year. We can not occupy the time of our readers with a repetition of the accounts already given of the leading investigations, but it may be worth while to recall to mind a few improvements that have been made, in order to encourage original workers to make renewed exertions to round up and complete certain desired inventions.

A cheap method of making hydrogen was suggested by Du Motay, the same chemist who has enriched our knowledge of the manufacture of oxygen, which consists in heating slaked lime with some carbonaceous material. It looks like a cheap and easy way of procuring a gas that would have extensive application in the arts, if it were available in unlimited quantity. When we have hydrogen in abundance, we can easily carburet it, and it would be a singular thing indeed if some day our illuminating gas were to be made out of water combined with slaked lime, and the distillation of coal were to be confined to the production of tar derivatives and aniline colors.

Our knowledge of hydrate of chloral has been much extended. A good deal of contradictory testimony exists in reference to it, and we are now going through the doubtful stage, in which the skeptical refuse to believe, and the credulous are much disturbed in mind. We have taken pains to give both sides a fair hearing, and the summing up of the evidence lead us to think that as a hypnotic the hydrate of chloral is one of our most useful remedies; but it ought never to be applied without the knowledge and consent of the best medical authority. The employment of chloral as a reducing agent, in many chemical processes, is novel, and bids fair to become a very important one. The incidental products growing out of its manufacture on a large scale, have also found an use in the dye vat, so that our knowledge of this subject has decidedly increased during the past six months.

The increasing demand for albumen has occasioned more than the usual activity in the search for new sources of supply. While merchantmen look to far off islands, frequented by wild birds, the chemist examines home products, and finds in the blood a supply of albumen, that ought to be better economized and more largely used than it has hitherto been. Blood albumen is becoming a large article of manufacture, and some specimens we have seen are but little inferior to the best product of the egg. The sugar refiner, the photographer, the calico and aniline printer, consume large quantities, hence the attention bestowed upon this branch of industrial chemistry.

Beet sugar and grape sugar, two industries of the first importance, have received extraordinary attention of late, and they are likely to develop into sources of wealth to those who enter upon them with adequate knowledge and proper caution. In a country where corn is grown in such enormous quantity as on the prairies of the West, grape sugar made from starch ought to become an article of export. Its uses in the arts have increased wonderfully, and the demand for it is likely to advance just in proportion as a popular knowledge of its value is further disseminated. Beet sugar is undergoing experimental examination, as we have shown, and bids fair to assume importance in this country as well as in Europe.

The artificial production of cold by chemical means has been considerably studied, and we have published all that has been made known on the subject. The most successful agent thus far appears to be ammonia, and it is peculiarly fortunate that this chemical product can now be obtained very cheaply and in large quantities. Ammonia, as a motive power and as a refrigerating agent can justly claim the attention of all experts. It is only a few years since the first organic compound was made by artificial means. The announcement of the discovery was everywhere greeted with profound attention, as the thought was near that at some future time we should be able by synthesis to make such rare and valuable medicines as quinine, morphine, codeine, and narcotine. Within a few months we have been able to give an account of the artificial production of coniine, one of the alkaloids, and this discovery offers encouragement that we are making progress towards the grand result indicated above.

The use of chlorine gas in metallurgical operations, although suggested some years since, has recently been brought more prominently before the public in connection with the toughening and refining of gold. As the production of chlorine gas can now be economically accomplished on a large scale, more particularly by Deacon's process, the attention of chemists is more than ever directed towards it, and there appears to be little doubt that it will obtain extensive use in the separation of many metals. The rare elements, silicon and aluminum, are more readily obtained from chlorine compounds than in any other way, and it is probable that gold will hereafter be refined by the use of this gas.

The applications of glycerin have gone on increasing, and especially for nitro-glycerin and dynamite we note for it an unusual demand. The chemical nature of glycerin, its boiling point, its solvent properties, and the temperature of its distillation, have been made the special subjects of inquiry during the present year, and much progress has been made.

Another chemical product, called carbolic acid, has been subjected to numerous experiments until it has become an important article of commerce.

From this hasty summary, it will be apparent that chemists have not been idle, but have contributed a fair share of our general stock of useful knowledge.

PAINE'S ELECTRO-MOTOR.

We recently published a series of engravings illustrative of the above improvement, together with such information as had reached us concerning its actual and anticipated performances. We were a little fearful that our estimates, although derived from good sources, might be considered by the parties in interest as somewhat overdrawn. But it appears from a letter from Mr. Paine, which we elsewhere publish, that instead of over-estimating we have greatly under rated the capacity and merits of his alleged discovery.

He states that the electric engine now running at Newark, N. J., has been in constant operation for eight months, running nine hours a day, doing a duty of 67,000 foot-pounds (a little over two horse-power) with a consumption of only three ounces of zinc per day—a cost of less than two cents.

In previous articles in our columns bearing upon the subject of electro-motors, calculations have been given, showing that the mechanical equivalent for twenty-two pounds of zinc, or the consumption of that quantity of zinc in such a manner that its total mechanical effect could be realized, would be a duty of two horse-power maintained for nine hours. Between these calculations and Mr. Paine's statements, there is, consequently, a very wide difference.

Mr. Paine further tells us that he expects to realize from his new engines a force of sixty-seven millions of foot-pounds, or two thousand horse-power, at a cost of three grains of zinc; and that he will be able to drive the largest ship afloat (the *Great Eastern*, we suppose) by means of a single Bunsen quart cell, with a velocity only limited by the strength of the vessel. One hundred and fifty miles an hour will be a moderate velocity, according to Mr. Paine's science, for the future speed of the great ship.

With these wild dreams for a basis, it would seem like a difficult undertaking for the Paine Electro-Magnetic Engine Company to find purchasers for their scrip. But Mr. Paine assures us that he has secured a chosen band of adherents, composed of "men that you and I cannot mislead." We conclude that every bubble, like the dog, must have its day.

We have not space to discuss Mr. Paine's turpentine light which he gives us to understand still flickers, although, as a sensation, it long ago burned out.

THE INAUGURATION OF THE MORSE STATUE.

We do not believe there was a single right feeling individual in the entire civilized world who did not feel a glow of pleasure when it was announced that the telegraph operators of this country intended to erect a statue in Central Park, in honor of the venerable Professor Morse.

They gave their dollars, and procured the statue, and the inauguration took place last week, too late for notice in our last issue.

The ceremonies were of great interest. Speeches—of which that of the venerable Professor himself, which we give in another column, was the best of all—together with poetry and music, crowned the occasion, and thousands gathered together to show their appreciation of the event, and of him in whose honor the statue was erected.

The following was the order of exercises in the Park:

1. Music by the U. S. Band, of Fort Columbus.
2. Introductory address by Gov. Hoffman.
3. Unveiling the statue by His Excellency, Gov. Claflin, of Massachusetts, and Hon. William Orton.
4. Music.
5. Inaugural address: William Cullen Bryant.
6. Reception of the statue by Hon. A. Oakey Hall, Mayor of the City of New York.
7. Music.
8. Prayer by Rev. Stephen H. Tyng, D.D., rector of St. George's, N. Y.
9. Doxology, by band and people.

In the evening, the Academy of Music was crowded by interested citizens. Hon. Wm. Orton presided. Professor Morse sat at the right of the stage, the observed of all observers. After speeches by Messrs. Orton and Dr. George B. Loring, of Boston, the following telegram was dispatched to the telegraphic fraternity throughout the world:

"*Prof. Morse sends greeting to those of the telegraphic fraternity throughout the world. 'Glory to God in the highest, peace on earth and good will to men.'*"

Miss S. E. Cornwell, who transmitted the first message ever sent by the Morse system also transmitted this message, and Prof. Morse telegraphed his own signature, as the closing act of his telegraphic career. The utmost enthusiasm prevailed, and a more fitting tribute of a grateful people to a public benefactor never took place in this city.

FLYING MACHINE.

The famous old Novelty Works, in this city, once a scene of constant activity, now present an aspect of desolation. The machinery is all removed, and the entire floor of the principal building is empty, save that in the center stands a flying machine.

We know not who is the inventor of this machine. The watchman of the premises told us it had been left to its own devices for six weeks or more, and, strange to say, that it had proved a failure. A watchman's judgment, however, is not generally very reliable on such matters, and as our questioning failed to elicit any knowledge of the principles of the device, we examined it minutely ourselves. As many of our readers are interested in the subject of aerial navigation, we place before them a description of the mechanism.

It is designed to be driven by steam. A two-horse power vertical boiler is supported in a light frame at the bottom of the machine. At one side of the top of this frame is placed one of Root's rotary engines. On the shaft of this engine is a miter gear, which meshes into two others, one at the top and another at the bottom of the gear on the engine shaft. The two driven gears are respectively keyed to a solid shaft and a hollow shaft, the former rising vertically