Improved Automatic Horse Hay Rake.

That the department of agriculture is highly estimated by inventors, at least as affording a field for the exercise of their tal- ents, is sufficiently proved by the frequently offered improvements in implements of husbandry, especially those designed to save labor and time. Among these none have received more frequent attention than those relating to the cutting and gathering of the hay crop, and none have been of greater utility. To be sure, objections to their use and difficulties in their management have been found in a number of horse rakes, but improvements following improvements are rapidly bringing this implement to perfection. The engraving presents a perspective view of a horse hay rake which offers some points believed to be improvements not found on other machines.

HUNSBERGER'S PATENT SELF-DISCHARGING HORSE RAKE.

The wheels, two in number, are rigidly secured to their respective axles, the outer bearings of which are in a box secured to the under side of the main frame of the machine and the inner portion supported by similar boxes secured to cross bars of the frame. The inner ends of the two axles support a gear or pinion turning freely, the outer faces, or sides of which are formed into ratchets with which sliding ratchets on the respective axles engage, these latter allowed to slide on the axles, but held to the ratchet sides of the pinion by means of spiral springs, and connected to the axles by pins traversing slots in the axle, or by forming the axle ends and the holes in the clutches square. This gives independent action to each wheel in backing and unites the two wheels, when the vehicle moves forward, so that the two axles act as one. A toothedrack bar, connecting at one end with a lever having a handle at the top, and at the other end with a foot lever in front of the driver's seat, serves to raise by means of the pinion on the main shaft or combined axle, the teeth of the rake, which pass through slots in a hinged bar at the rear of the machine. The separate teeth are attached to thimbles that turn freely and independently on the rake head shaft, so as to enable them to reach depressions in the surface of the field. When driven on the road the rake teeth are held from the ground by the lever at the right hand of the driver's seat. To discharge a rake-full of hay the driver presses upon the foot lever, bringing the rack in contact with the pinion that raises the rake, and allows it to fall soon as the rack section has passed the circumference of the pinion. The operation of the machine and its advantages may be comprehended by an examination of the engraving in connection with this description. It will be seen that the operation of the rake is at all times under the control of the driver, and that except when he wishes to instantly elevate the rake teeth by means of the hand lever, both hands will be free to guide the horse.

Patented June 16, 1868, through the Scientific American Patent Agency, by Jonathan Hunsberger, who may be addressed for the sale of the entire right, or for state and county rights, at Skippackville, Montgomery Co., Pa.

Improved Engine and Signal Oils for Railroads.

Throughout the country, says Pease's Oil Circular, there is a better demand for first-class oils. In many cases what is gained in price of cheap oils is lost ten times over in the repair account. There is an enormous loss of power in our railroads by the use of cheap oils, and we include in this those oils easily affected by heat. The experiments of Metz and Morin in 1831, and others up to the present date establish the fact that the amount of friction is found to be dependent rather upon the nature of the unguents than upon the surface of contact, and the nature of the oils must be measured by the pressure or weight tending to force the surfaces together.

There is no question but that there is a loss of 30 to 56 per cent of power on most of the roads in this country by not looking into and understanding the laws of friction, and the effects of heat and pressure upon the oils used. They must be based upon scientific principles, and adapted to the uses intended, otherwise they fail to accomplish any satisfatory results, and a great loss of power and destruction of machinery is the result.

Friction, immediate or long continued has the same effect upon oils; in one case it is immediate, as in a steam cylinder, in the other it is slow and long continued, as on the slides and smaller bearings. Oils must be made to form a perfect separation, otherwise the friction is increased and is dependent upon its greater or less viscosity, whose effect is proportional to the extent of the surface between which it interposed.

Those roads that have looked into this important matter, ranking the third or fourth in expenses, are now saving tens of thousands of dollars every year.

There is no occas on for a hot journal on any road under ordinary circumstances and using proper oils. There is no occasion for cutting of journals and destruction of valve seats, if a little thought would only be given to the subject of pressure and friction. The wonderful chemical effect of some of the poor cheap oils upon the iron surfaces and journals of some of the roads is entirely overlooked. Has it ever occurred to railroad men that the use of oils of strong acid reaction has a tendency to weaken the strength of the boiler itself, as they have the power to cut and destroy the bolts of the steam chest and cylinder?

THE INVENTOR OF THE VELOCIPEDE.—The last number of the *Moniteur de la Photographie* of Paris, (1st Nov., 1868) has an interesting series of letters upon the invention of the velocipede, which, it appears, would be due to Niepce, for whom is claimed also the invention of photography. The letters in question are written from Claude Niepce to his brother Nicephore Niepce, and are dated from Hammersmith, near London, Nov. and Dec., 1818, and August, 1819. We do not glean from them that the first idea of a velocipede originated with Nicephore Niepce, but simply that he was occupied with some experiments concerning the improvement of this kind of locomotive. If no mention can be found of a velocipede prior to the year 1818 doubtless Niepce has good claim to its invention.

KASSON'S CONCAVO-CONVEX AUGER AND BIT.

The front or working faces of this auger bit are concave and the rear faces are convex giving great strength to the twist and removing the chips without undue friction against the edges of the hole, thus preventing clogging and gumming. The cutting lip is merely a continuation of the twist, so that if the auger should be broken at any portion of its length another screw and other cutting edges can be formed by cutting the twist at a plane nearly at right angles with the axis of the auger. The convexity of the cross section of the twist, increasing toward the center, is, in effect, a strengthening rib, making a very stiff tool. This auger, or bit, is adapted to all kinds of wood, hard or soft, and is specially adapted for boring hubs, pumps, etc., and to all descriptions of wood boring machinery. Having less friction than the ordinary style of auger it is less liable to become heated, and it relieves itself perfectly of the chips, without clogging, and does not require to be withdrawn for clearance.

Patented through the Scientific American Patent Agency, January 15, 1867 (reissue dated April 9, 1867), by A. C. Kasson of Milwaukee, Wis., assignor to himself and N C. Gridley of St. Louis, Mo. Manufactured and for sale by the Humphreysville Manufacturing Company; J. M. Watkins, agent, who may be addressed at No. 5 Gold street, New York.

A CURIOUS fact in connection with the practical working of the Atlantic Cable Telegraph is that messages sent from London to-day arrive in New York yesterday.

A Newly-Discovered Property of Gun-cotton.

It has been found that the explosive force of gun-cotton may, like that of nitro-glycerin, be developed by the exposure of the substance to the sudden concussion produced by a detonation; and that if exploded by that agency, the suddenness and consequent violence of its action greatly exceed that of its explosion by means of a highly heated body or flame. This is a most important discovery, and one which invests gun-cotton with totally new and valuable characteristics; for it follows, as recent experiments have fully demonstrated, that gun-cotton, even when freely exposed to air, may be made to explode with destructive violence, apparently not inferior to that of nitro-glycerin, simply by employing for its explosion a fuse to which is attached a small detonating charge. Some remarkable results have been already obtained with this new mode of exploding gun-cotton. Large blocks of granite and other very hard rock, and iron plates of some thickness, have been shattered by exploding small charges of gun-cotton, which simply rested upon their upper surfaces—an effect which will be sufficiently surprising to those who have hitherto believed, as every one has believed, that unconfined gun-cotton was scarcely to be considered as explosive at all, that it puffed harmlessly away into the air, not exerting sufficient force upon the body on which it might be resting to depress a nicely balanced pair of scales, supposing the charge to be fired upon one plate of the scale. Further, long charges or trains of gun-cotton, simply placed upon the ground against stockades of great strength, and wholly unconfined, have been exploded by means of detonating fuzes placed in the centre or at one end of the train, and produced uniformly destructive effects throughout their entire length, the results corresponding to those produced by eight or ten times the amount of gunpowder when applied under the most favorable conditions. Mining and quarrying operations with gun-cotton applied in the new manner have furnished results quite equal to those obtained with nitro-glycerin, and have proved conclusively, that if gun-cotton is exploded by detonation, it is unnecessary to confine the charge in the blast hole by the process of hard tamping, as the explosion of the entire charge takes place too suddenly for its effects to be appreciably diminished by the line of escape presented by the blast hole.

Thus the most dangerous of all operations connected with mining may be dispensed with when gun-cotton fired by the new system is employed. It will readily be observed that this discovery, which we believe is due to Mr. Brown, of the English War Office Chemical Establishment, is likely to be attended with the most important results. Not merely is the strength of gun-cotton exploded in this way much greater than that of the same substance fired by simple ignition, but it now operates under conditions which were sufficient under the old system practically to deprive gun-cotton of its power. It has been said, and said justly, that if you want gun-cotton to exert itself you must coax it into the belief that it has a great deal to do. You must give it bonds to break and physical obstacles to overcome, with no outlet or possibility of escape. But now gun-cotton will exert itself, and put forth more than what was believed to be its full strength, whether to see any work to do or not. It will behave as less coy explosives have behaved before it—always with this difference, that it is half a dozen times as powerful as any of its rivals, with the exception of nitro-glycerin, to which in mere power even it is not inferior. This discovery, therefore, can hardly fail to give a considerable impetus to gun-cotton, and to lead to its universal adoption for mining purposes, as soon as its new properties become generally known. In connection with possible military applications the discovery is invaluable. There can no longer be any doubt what agent should be employed for the breaching of stockades and the like; and the absence of all necessity for the use of strong confining envelopes will have an important bearing on the employment of gun-cotton for torpedoes and all submarine explosive operations, beside greatly simplifying mining and breaching operations in the field. We have, in fact, discovered several new advantages to add to those which already had sufficed to recommend gun-cotton as an explosive agent in preference to all others. The conditions that are fulfilled by a detonating fuse in determining the violent explosion of gun-cotton, under circumstances which hitherto have been altogether unfavorable to such a result, have been made the subject of investigation by Mr. Abel, and we hope at some future time to notice the conclusions at which he has arrived, as they appear to have a very important general bearing upon the conditions which regulate the development of explosive force, not merely from gun-cotton and nitro-glycerin, but from explosive compounds and mixtures generally.

A MICROSCOPIC club has been organized in Chicago. Two well-known citizens express a willingness to give liberally toward purchasing iustruments and scientific works upon the subject of microscopic instruments.