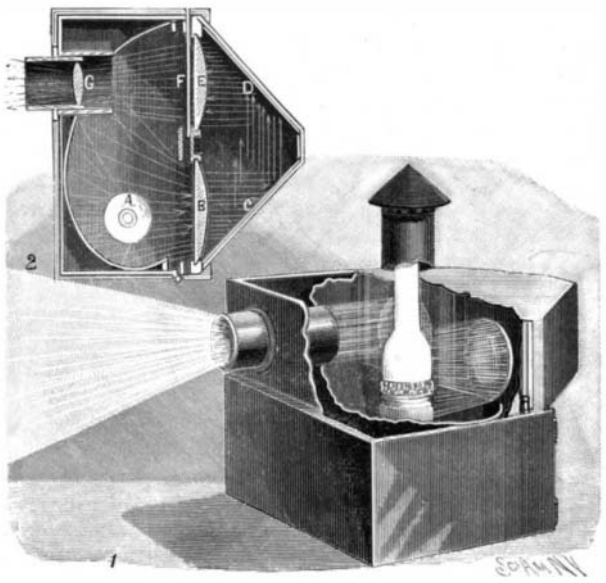
reconstruction commenced in earnest. The value and quantity of relics which are buried beneath these structures can only be conjectured.

IMPROVED PICTURE PROJECTING APPARATUS.

Heretofore magic lanterns have been devised either for projecting transparent pictures only, or for projecting opaque pictures only. Some transparency projectors, however, have been provided with an attachment whereby the same may be converted into a projector for opaque pictures. While this is suitable for certain classes of exhibition it nevertheless falls short of the requirements when it is desired to exhibit transparent and opaque pictures interchangeably; for considerable time is consumed, and trouble involved, in making proper adjustments necessary to effect the change from one class of picture to the other. Moreover, certain specially interesting pictures or objects—viz., those partly transparent and partly opaque—cannot be projected by such lanterns. With these conditions in mind Mr. George W. Smith, of Evanston, Ill., has recently produced and patented an apparatus which will project any class of picture or object without requiring any special adjustment. The invention is applicable to any kind of magic lantern, but more particularly to the form commonly known as the megascope.



IMPROVED PICTURE PROJECTING APPARATUS.

As shown in our illustration, the invention comprises a lantern box, at the rear of which is hinged a reflection chamber having vertical walls arranged obliquely with respect to the front wall of the box. A light, *A*, for example a Welsbach light, is located at one side of the lantern box at one focus of an ellipsoidal reflector, the picture or object to be projected being inserted at the other focus. On the opposite side an opening is formed in the reflector for the admission of the objective tube. Rays from light, *A*, pass through a condensing lens, *B*, to one of the oblique walls of the reflector chamber. Reflectors, *C* and *D*, are provided on these walls and they act to reflect the rays back through a condensing lens, *E*. A transparent lantern slide, *F*, when placed before the lens, *E*, intercepts the rays and permits the proper gradations of light and shadow to be projected by lens, *G*, onto the screen. Such is the effect when a transparent slide is used. When an opaque slide is to be projected, the direct rays from lamp, *A*, and also the indirect rays concentrated by the ellipsoidal reflector, illuminate the front of the slide, and the proper image is thus reflected through lens, *G*, to the screen. If the slide be partly opaque and partly transparent or translucent, the lantern will operate simultaneously as a megascope and sciopticon combined, thus, without any change, producing unique effects in a very simple, inexpensive and yet satisfactory manner.

The lantern should be very useful for scientific purposes for the reason that the same object may be projected by reflected light alone or by transmitted light alone, or by both simultaneously without removing the slide or changing the adjustment of the projector.

MOVING LARGE TREES.

An Iowa inventor has devised a very effective machine for lifting and moving heavy and cumbersome objects. The machine, which we illustrate herewith, though primarily designed for lifting rocks and bowlders, has nevertheless been found equally useful for raising and transplanting large trees. A description of this tree-lifter should prove of great interest to landscape gardeners, for it provides them with an easy and comparatively inexpensive means for transplanting and setting out large trees without injuring them. Our engraving shows the machine handling a tree 1 foot in diameter and 30 feet long. This, however, does not illustrate the full capacity of the lifter, for it has easily transplanted trees as large as 20 inches in diameter. The frame of the machine is V-shaped, the rear wheels of which support the outer ends of the frame while the apex rests on the front truck. Thus it is possible to back the machine up to the tree which it is desired to move so that the two arms of the frame will straddle the trunk. When the machine has been backed sufficiently to bring the hoisting drum into contact with the trunk, the front truck is swung around at right angles to the rear wheels so as to give a firm anchorage for the machine when the hoisting mechanism is operated. The horses are now detached from the machine and are hitched to the hoisting gear. A connecting rod is fastened across the rear extremities of the V-shaped frame, and serves the double purpose of increasing the rigidity of the machine and of supporting the trunk when the tree is drawn out of the ground. A padded roller on this connection serves to prevent injury to the trunk. A bar-chain is now placed around the roots of the tree, which have been previously cut loose from the surrounding earth. This chain is attached to the lifting-drum and the tree is slowly drawn up until the roots clear the ground. At the same time the trunk gradually sinks back until it is supported by the padded roller. The power for thus raising the tree is supplied by the team, which, as stated above, is hitched to the hoisting mechanism. The tree is locked in this position by a ratchet wheel and is now ready for transportation.

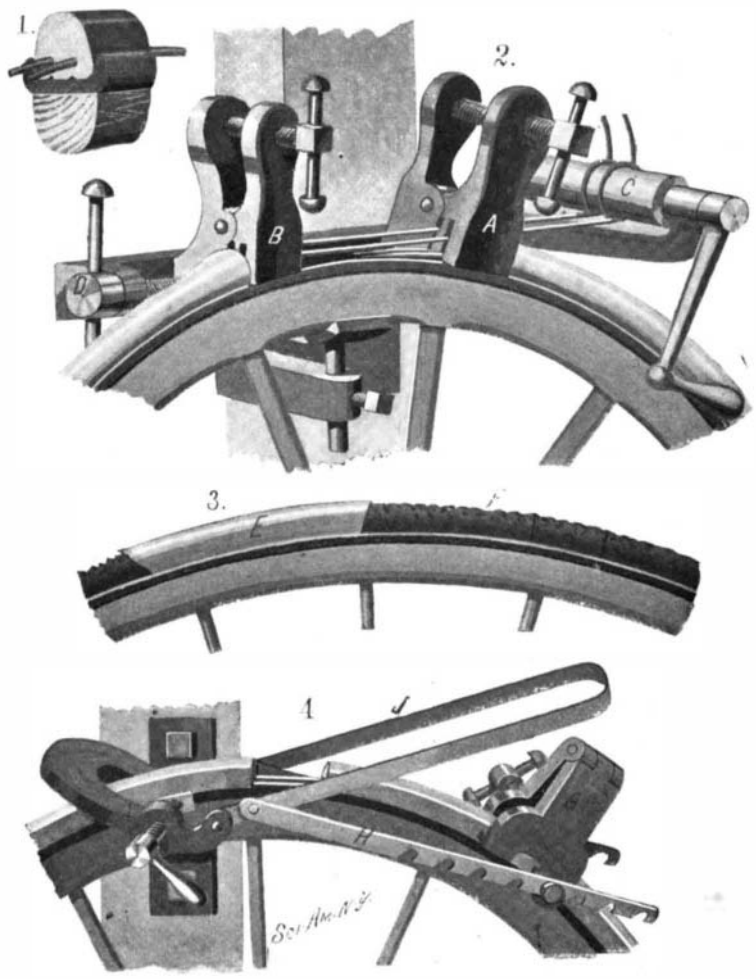
It is evident, of course, that a large hole has been left in the place which the roots of the tree occupied, a hole probably larger than can be safely straddled by the rear wheels. It is interesting, therefore, to note the novel method by which the machine is moved away from this cavity without its wheels sinking therein. Instead of being pulled directly forward the front wheels of the machine are first circled around the hole on the outer rear wheel as a center, until the machine occupies a position approximately at right angles to its original position, when, the hole having been cleared, the tree can be transported to any desirable locality. It is evident that by this method any hole can safely be avoided whose diameter does not exceed the distance between either of the rear wheels and the inner wheel of the front truck when turned at right angles. With the machine shown a hole of 14 feet diameter may thus be circled. When replanting a tree the same method must be pursued to avoid the cavity into which the roots are to be planted. When the hole has been sufficiently circled to bring the roots directly over the center, the tree is slowly lowered under control of a friction brake. In our illustration the operator of the machine may be seen grasping the lever of this friction brake. As soon as the roots have been lowered into the cavity, the machine is drawn forward, thus gradually raising the tree into an upright position. Guy ropes are then fastened to secure the tree in place, after which the rear connection is swung open and the machine is drawn off.

The frame of this tree-lifter is very strongly constructed of Washington fir, white oak and hickory with very heavy iron bracings. It has a direct lifting capacity of over 50,000 pounds, and it will, therefore, readily be seen that the machine would prove serviceable for moving heavy objects of all descriptions.

POWERFUL MACHINE FOR MOVING LARGE TREES.

SOLID RUBBER TIRE SETTING MACHINE.

Solid rubber tires are ordinarily secured to carriage wheels by a steel tape or a pair of wires which run longitudinally through the tire, near its under surface. At present the wires seem to meet with more favor than the steel tape, and the reason for this lies probably in the fact that the tape first used was not heavy enough for the purpose, and soon broke or rusted away. Heavier tape is now used with better results; but a prejudice once formed is hard to overcome and wired tires still hold the lead. Aside from this prejudice there may be some good reasons for the preference of wire over steel tape. To admit the tape, the tire must have an opening which is much longer, in cross-section, than the sum of the diameters of the two wire openings. The tire is thus greatly weakened, and the more so when we consider the fact that the tape offers more of a cutting edge, even though its edges be rounded, because the diameter of the wires is greater than the thickness of the tape.



SOLID RUBBER TIRE SETTING MACHINE.

In Fig. 1 we show a section of a wheel rim with a wire-strung tire in place. The channel rim, which is secured to the felloes of the wheel, has a flange along each side, between which the tire is set and held by the two wires. The manner of stretching these wires and splicing their ends together, so as to form endless rings, is very interesting. A number of different machines have been designed for this purpose, among the simplest of which is the mechanism here illustrated. In Fig. 2 we have the machine for setting and splicing the wires together, after which the rubber must be straightened out and set by the device shown in Fig. 4. Both mechanisms are very compact and take up almost no room, because they can be fastened to the side of the wall, or against a post or column of the repair shop.

The wire-setting device consists of two clamps, one clamp, *A*, being stationary. The other clamp, *B*, is movable, being mounted on the tightening screw, *D*, by which it can be made to travel along the tracks on the main frame. A bracket projects out from the frame a short distance below the two clamps, and on this the wheel is hung, the felloe resting in an adjustable support which is raised sufficiently to bring