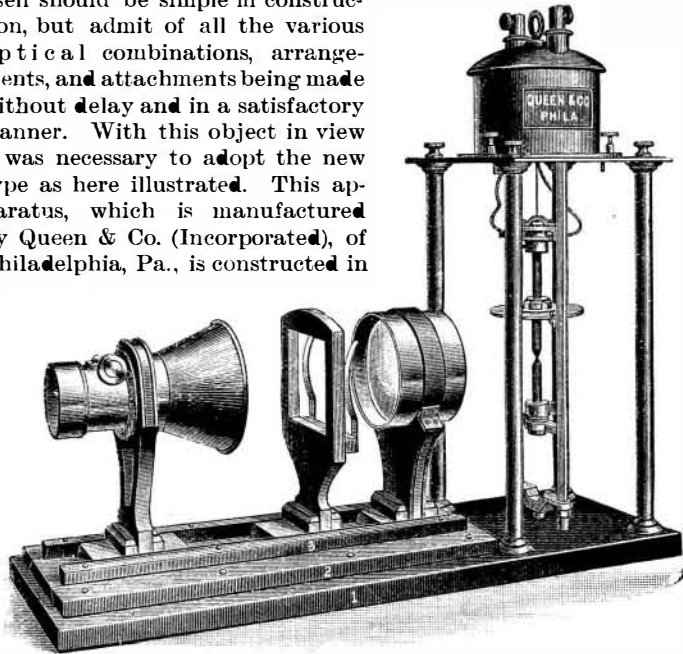


THE "PARAGON" PROJECTION LANTERN.

It is usually claimed for most projecting lanterns that they are suitable for educational purposes, and so far as the ordinary projection of diagrams and pictures are concerned, this may be the case to some extent.

That is, however, only a small part of the work that is expected to be performed with the educational projector; for the illustration of physical laws, for the performance of chemical experiments and for the projection of microscopic specimens; special facilities must be offered for each of these branches, the projector must be furnished with accessories and adjustments which shall enable an experienced lecturer to obtain the most complete results in all cases. The projector itself should be simple in construction, but admit of all the various optical combinations, arrangements, and attachments being made without delay and in a satisfactory manner. With this object in view it was necessary to adopt the new type as here illustrated. This apparatus, which is manufactured by Queen & Co. (Incorporated), of Philadelphia, Pa., is constructed in

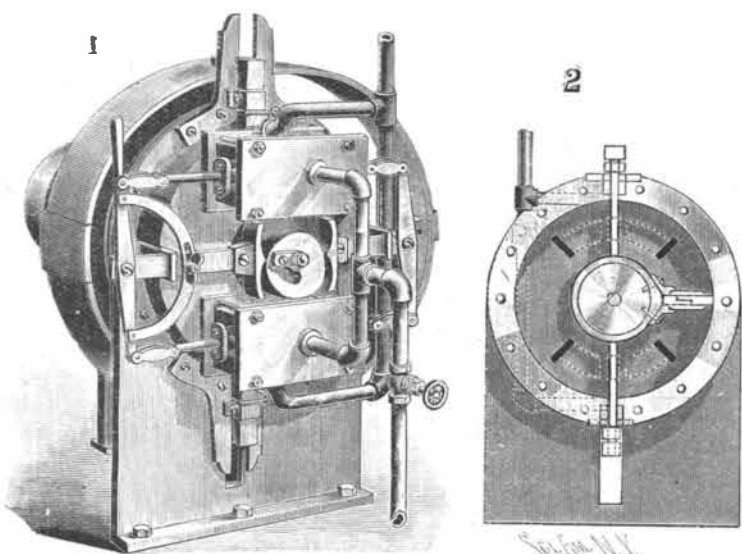


THE "PARAGON" PROJECTION LANTERN.

two parts: the lamp and stand for the electric light, and an optical bench with sliding bases and standards which support the optical and other apparatus. So simple is this plan in its operation that the accessories can be exchanged in a few minutes, as, for instance, the vertical prism can be located on the base or taken off for the microscope to take its place, and so forth, with the absolute certainty that all parts required in the exhibition are perfectly in the optical center. A few of the more important accessories will here be described:

The vertical attachment is constructed with a plane reflector, condensing lens, upright stem with arm to carry the objective and right-angled prism. This apparatus is indispensable for the display of many physical and chemical experiments.

The microscope requires certain arrangements to bring a full course of light with as little heat as possible to the object to be exhibited. The distinguishing feature of this projection microscope is found in the



GOULD'S ROTARY ENGINE.

application of an achromatic negative lens to convert the converging rays coming through the condensing lens into a cylinder passing to the secondary condenser; these are provided with rack and pinion, so that the illumination of the object can be adjusted with great nicety. Not only is the silvery whiteness of the arc light a great advantage, but as the radiant is comparatively a point, the definition given by a good objective is superb. Abundant light is at hand for obtaining a power of 1,000 to 3,000 diameters with perfect definition; a flea may be enlarged to fifteen feet in length.

The polariscope can be constructed in several ways. The refracting polariscope is composed of two Nicol prisms, one being used as a polarizer, the other as an

analyzer; or a bundle of glass plates for a polarizer and a Nicol prism for an analyzer.

The reflecting polariscope is, however, more effective. It has two reflecting surfaces for the polarizer and a Nicol prism for the analyzer. The performance is perfect. All three of the above polariscopes are direct acting. The stage, or object holder, is furnished with a rotating plate in front and a separate slip holder back to facilitate the performance of plane and circular polarization.

The arc lamp employed is a very fine illustration of accurate workmanship, neat in appearance and perfect in its performance. Not only does it maintain a steady silvery white light, but it also automatically holds its position in the exact optical center until the carbons are finished.

AN IMPROVED ROTARY ENGINE.

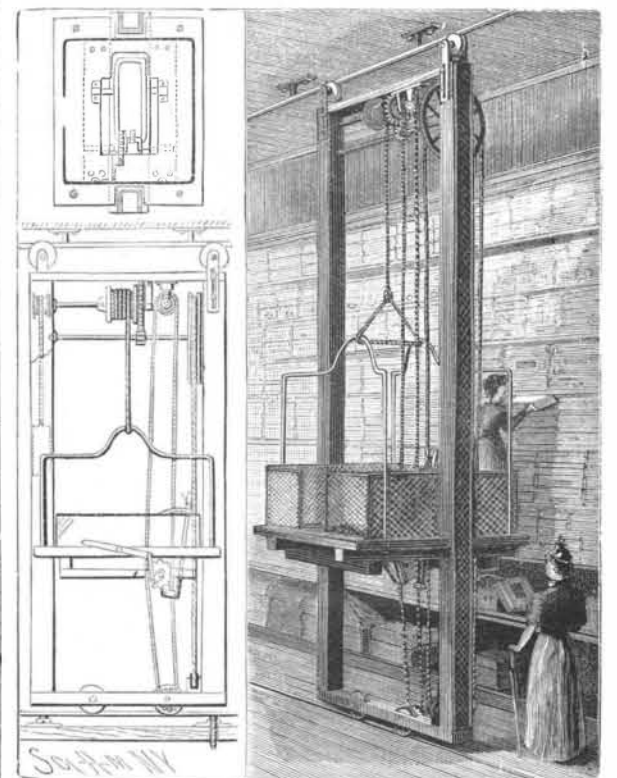
In this engine, which has been patented by Mr. O. O. Gould, of Copemish, Manistee County, Mich., the cylinder is preferably made in two parts bolted together and rigidly supported on a frame attached to a suitable foundation. Fig. 1 is a side view of the engine, Fig. 2 being an interior view of one-half of the cylinder. In the central bore of the cylinder are heads in which is journaled the main driving shaft, on which is a central disk supporting a piston, as shown in Fig. 2, the piston having suitable overlapping and spring-pressed packing plates engaging the sides and inner cylindrical surface of the rim of the cylinder. In suitable guideways arranged in the sides of the cylinder two opposite gates or abutments are mounted to slide radially, the outer ends of the gates having slotted heads engaging the continuous rim of a cam secured on the main driving shaft, so that the revolution of the latter causes the inward and outward sliding of the gates. The guideways in which the guides of the gates slide form part

of the main frame, and the cam is so arranged that during one-half of the revolution one gate remains stationary in an innermost position, while the other gate is moved outward and back again. The two steam chests on the front of the cylinder, connected by pipes with a suitable source of steam supply and pipes to carry off the exhaust, are provided with slide valves, each having on its under side two cavities. These valves operate over the four elongated ports of the interior of the cylinder, as shown in Fig. 2, two of the ports being arranged diametrically opposite two other ports, and on opposite sides of a sliding gate. The valves also operate over exhaust ports midway between the live steam ports. The stems of the valves are connected by links at their right-hand ends with a lever centrally fulcrumed on a slide, and at their other ends with another similarly fulcrumed lever, which is also a hand lever. On the latter lever is a segment with segmental slot engaged by a bolt on the slide, so that when the nut of the bolt is loosened the lever may be moved to change the position of the valves and reverse the engine. A cam held loosely on the driving shaft, and carried around by a pin in a segmental slot of the cam, engages oppositely located arms on the slide to give to the latter a sliding movement, the arrangement permitting of changing the position of the slide when reversing the engine without disturbing other parts. Part of the peripheral edge of the cam is concentric, so that the valves are held stationary during part of a revolution of the shaft, and when in their outermost position in the steam chests, but each full revolution of the shaft imparts a full stroke to the right and to the left to each of the valves.

A MOVABLE ELEVATOR FOR USE ON STORE FLOORS.

This elevator, adapted for use on one floor only of a building, and which may be readily moved to various positions, enabling articles at different elevations to be reached, has been patented by Mr. Robert W. Parmenter, of Yutan, Neb. The small figures represent sectional side and plan views of the improvement, the operation of which is shown in the large view. The upright posts of the frame are hollow, one side covered by screening, and adapted to carry a counterbalance. Rubber-lined, grooved wheels, journaled at the top and bottom of the frame, run upon parallel tracks on the floor and ceiling, the floor track being mounted on screws projecting through floor plates, whereby the height of the lower track may be regulated to cause the wheels to fit snugly at the top and bottom. The elevator car is suspended by bails to which is attached the hoisting cable, extending over a drum carried by a shaft jour-

naled in the upper portion of the frame, there being on one end of the shaft a pulley to which is secured a cable by which a counterbalance weight is suspended to move up and down in one of the posts whereby the car is balanced. The shaft at the top has a gear wheel engaged by a pinion on a lower shaft carrying at one end a pulley, over which, and over pulleys at the bottom of the frame, passes an endless rope, by pulling on which the occupant may raise and lower the car. The lower pulleys are journaled in vertically adjustable supports, whereby the tension of the rope may be regulated. On the shaft with one of the driving wheels at the bottom of the frame is also a sprocket wheel, in line with a similar wheel in a vertically adjustable hanger at the top of the frame, and the sprocket chain by which these wheels are connected engages also a sprocket wheel on a crank shaft journaled in the car. The crank is connected by a pitman with a treadle, the working of which operates the sprocket chain and revolves one of the driving wheels at the bottom to propel the entire structure along the track. By a lever carrying a clutch, and journaled in the floor of the car, the upper end of the lever swinging opposite a notched quadrant and having a retaining latch, the sprocket chain may be held in such engagement with the sprocket wheel that the elevator will be locked in a stationary position, or so that the

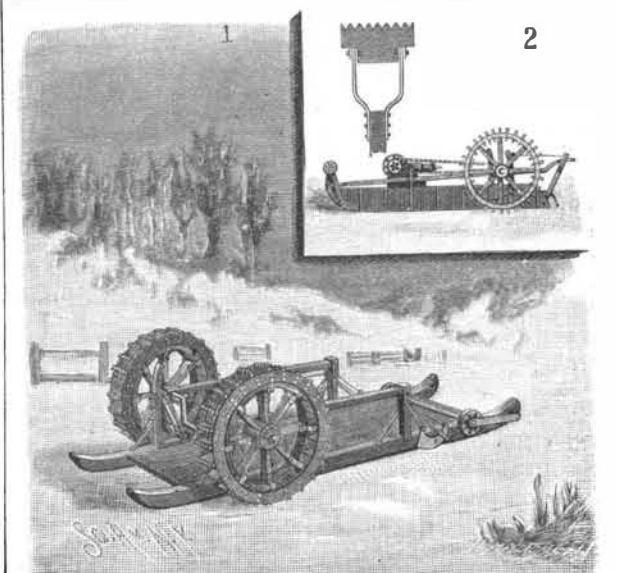


PARMENTER'S ELEVATOR.

chain may be operated by the treadle to propel the elevator. The mechanism is such that the elevator may be easily propelled and perfectly controlled.

'AN IMPROVED PROPELLER SLEIGH.

A sleigh designed to be readily propelled and steered over ice and snow, either by the occupant or by a suitable motor, is shown in the illustration, and forms the subject of two patents recently issued to Mr. Friedrich A. Schaefer, of Truckee, Cal. On bearings which permit of vertical adjustment at each side of the sleigh are journaled short shafts carrying paddle wheels of novel construction, adapted to engage the snow or ice to propel the sleigh forward or to steer it. The shafts may have suitable crank arms, for propelling the sleigh by hand, or they may be connected by pitmen with a motor, and the paddle wheels have spokes, each having its outer end forked, as shown in Fig. 2, the transversely extending paddles being made of sheet



SCHAEFER'S IMPROVED PROPELLER SLEIGH.