all the drawings *A* and *A1* are the pipes, *B* the packing strip, *C* the taper wedge, and *D* the compression ring.

The packing strip *B* formed of any suitable compressible material, such for example as lead or india rubber, is laid circumferentially round the joint of the pipes. It may be of any width considered desirable, and of rectangular, curvilinear, corrugated or other section, and its edges or ends may overlap or may butt together, either parallel with, or diagonal to the axis of the pipes. It may be in one or more pieces, and though generally a loose piece, it may, if preferred, be fastened either to the taper wedge, which is placed over it, or to one of the pipe ends. Or it may be run into place after the pipes are put together. The taper wedge *C* consists of a band or ring, preferably of steel or other metal, formed in one piece, in which case it is split, or of two or more segments, which may have the ends or edges butting or overlapping, parallel with or diagonal to the axis of the pipes. Packing may be used at the divisions to make them tight if necessary. The wedge may be of any desired length or thickness, and may be plain. Internally it is usually of equal diameter at both ends, but it may be formed with a taper. Externally it is conical or tapering, thus forming a circumferentially tapering compressible wedge or ring, which contracts in diameter under the pressure of the compression ring or sleeve *D* which is forced over it in making the joint. The compression ring *D* consists of a rigid hoop or sleeve, preferably of steel or other metal, of any suitable length or thickness, having its inner surface tapered to correspond with the external taper of the wedge *C*. The inner surface of *D* may be grooved or recessed to reduce the area of its bearing surfaces on the outside of *C*.

The joint is made by forcing the compression ring *D* over the split wedge *C*, thus contracting it, and compressing the packing strip *B* around the ends of the pipes *AA1*. Conversely the joint may be loosened or taken apart by withdrawing the compression ring *D*.

Any suitable means may be employed for forcing the compression ring upon the wedge, such for example, as hammering it on, or using screw, hydraulic, or other power. Clamps or bands may be used placed temporarily round the pipes, and drawn together by screw bolts; two or more hydraulic presses suitably mounted in a suspension cradle may be employed for closing the joint. After the joint has been made the packing strip may, if desired, be caulked into an annular space between the pipes and the ends of the taper wedge.

Referring to the accompanying drawing we see a joint in which the ends of the pipes are butted one against the other. The wedge, *C*, is provided with four projections, *C1*, internally, so as to put pressure on the packing strip, *B*, at those points. This joint is the invention of D. J. Russell Duncan, C.E., who has fully protected it by patents.

Mr. Duncan has also during his visit to Canada had set up at the Kingston Locomotive and Engine Co.'s works a rolling-down machine for producing Williams' patent wedge-joint pipes. By this process steel pipes are made from flat steel sheets, rolled cold by machinery, without the aid of furnaces or heating agencies, and at a cost for labor, it is claimed, less than the cost of producing pipes by other processes. The manufacturer of steel pipes on Williams' patent longitudinal wedge-joint system is dependent upon very simple machinery. Plates, as they are received from the plate mills, are cut to the desired width in a shearing or slitting machine. This machine shears plates perfectly parallel, at the rate of 15 feet per minute. After passing through this machine, they enter the nibbing machine, in which the edges of the plates are bent inwards for about a quarter of an inch. From the nibbing machine the plates pass on to the skelp machine, in which they are bent into semi-cylindrical form. Two plates are employed in the manufacture of each pipe. These plates are bound together by means of two bars of steel, rolled to a channel section. These bars are placed internally in the pipe and the edges of the nibbed plates fit into the recesses in the channel bars. The pipe is then firmly bound by two concavo-convex bars, which run the entire length of the pipe and fit into the channel between the nibbed edges of the plates. The pipe when fitted together ready for rolling down is shipped on a cast-iron mandrel on the rolling-down machine, which exerts great pressure upon the two wedges, and flattens them in such a manner that they are securely locked in the channel bars, and bind the edges of the nibbed plate so effectively that the pipes, when tested, are found to be absolutely water-tight. The wedge bars, rolled down in this manner, may be said to resemble a continuous longitudinal rivet.

The Vessot Grain Grinder attracted much attention at the Montreal Exposition, and will be entered at the Ottawa and Toronto Exhibitions. The machine is one of the best in the market, having been awarded a gold medal and diploma at the World's Fair, Chicago, 1893. S. Vessot & Co., Joliette, Que., are the manufacturers.

COMPRESSED AIR.

At pages 343-346, vol. 2, and page 317, vol. 1, of The Canadian Engineer, descriptions are given of the Taylor Hydraulic Air Compressor, now at work at Magog, Que., in operating six engines, showing the printing machinery of the Dominion Cotton Mills Company, using 155 h.p., giving a pressure of 52 lbs. to the square inch. Though very little has yet been done to call attention to the merits of C. H. Taylor's invention, yet its simplicity and the efficiency obtainable from a given fall of water are so great that manufacturers, miners, capitalists, scientists, and every one who may by accident have heard of it, are writing for any available information from all parts of America, Great Britain, and many European countries.

In the meantime, the company has been securing and perfecting its patents in all important countries, and already has sold the rights for British Columbia, Washington, Montana and Idaho, for a large sum, and a company has been formed with head office at Spokane, Wash., to instal the system in those parts. This company is becoming active, and arrangements are about completed to instal a plant at Ainsworth, B.C., to develop 500 horse-power for use in the mines within a radius of five miles.

The plant at Magog has now been tested in all seasons and the system has proved itself faultless, giving the company using it great satisfaction, both in its working and in its economy. No one can see where there is any probability of the plant wearing out or repairs being required during an ordinary life time, unless it be to increase the size of the plant to give more power.

All will accord to steam, electrical and water power their full value, allowing to each a field where they are supreme. All these are now well developed and their usefulness generally understood, yet compressed air, with its possibilities, is as yet a sealed book even to most scientists, though all are accustomed to the usual expression, "Compressed air is the coming power." It has come, and the world is indebted to Mr. Taylor for his ingenious invention, which transforms a water-power into compressed air at a minimum cost and maximum efficiency. Some of the advantages claimed for the system are as follows:—

1. It transforms a water power of any head into compressed air of any desired pressure without the usual intermediate losses.

2. Low heads of water, which would otherwise be useless for the production of power, can be used to advantage by this compressor.

3. The air is compressed at a constant temperature, viz.: that of the water, and is consequently delivered at a temperature generally below that at which it is taken into the compressor. Hence there is no loss of power by contraction in volume.

4. The air during compression is freed by the water of the greater part of its moisture, it being delivered so dry that it is impossible for condensation to take place during either its transmission or subsequent expansion.

Condensation and freezing of moisture in mains, etc., one of the chief obstacles to the use of compressed air, is entirely overcome by this method of hydraulic compression.

5. This compressor will maintain a constant pressure, even under a fluctuating head, without change of efficiency.

6. The compressor is entirely automatic in its action.

7. Owing to the absence of moving machinery the duration of a plant is almost without limit.

8. The absence of moving machinery dispenses with skilled labor, as practically no attendance is required.

9. When the compressed air is not used at the same rate as it is generated, it accumulates and may afterwards give, for a limited time, as much as double the average power developed by the compressor, without change of pressure. This storage of power is effected by displacement of water, and not by an increase of pressure.

10. A plant does not require to be covered by a building.

With the question solved as to the compressing of air economically, as it is by the Taylor system, it is only reasonable to expect that progress in rapid strides will now be made by engineers and others to perfect the motor or other apparatus which uses the air, as hitherto all attention was given to the compressor and none to the motor, whilst in the use of steam all attention was given to the perfecting of the engine and not the boiler. The general public can find but little information on compressed air; the most accessible being such as is found in catalogues, in words such as "if you don't buy our compressor you can't use compressed air," in effect condemning unintentionally compressed air. Thus, also, has advancement in its use been retarded.

Again, how little knowledge is abroad regarding the transmission of air power; or, going further, how few engineers or scientists know anything of importance regarding its transmittable qualities? As it can only be transmitted through pipes, there is of course some decrease of pressure from friction, and hence some loss of power at the delivery