iron pipe must be watched very closely so that the joints do not heat; it has lower resistance, higher conductivity, requiring more current, in order to make more heat, therefore you must watch the unions—that is where the heat occurs. It is necessary to use a source of current which does not affect the electric light lines or other transmission lines; if current is taken from them, danger may result. We have therefore ordinarily used a transformer in the work, but in some cases have used dynamos directly. The source of current should have a pressure of not less than 50 volts. To thaw out 500 feet of a six-inch main in half an hour requires 800 amperes; if you are unable to get more than 400 amperes it will take four times as long, or two hours. Eight hundred amperes will thaw out 500 feet of a 12-inch main in one hour, and a 24-inch main in two hours, etc. The source of current for water mains should have a pressure of not less than 200 volts.

"In preparing to thaw out a water main, connect with two hydrants, winding the wire around the hose nozzle. Screw hydrant nozzle cap up to the wire, making a close connection, commence at open end, where there is no frost, with 800 amperes or less and 200 volts, and thaw say 500 feet at a time. Water should be kept running for at least an hour after the main has been thawed, as it will take that length of time before the water will be slightly warmer. Three-quarter h.p. will thaw a six-inch main in half an hour per foot length; two-tenths h.p. will thaw a one-inch, and one-eighth h.p. will thaw a five-eighths service pipe in half an hour per foot length. There is no danger from electrolysis, on account of the short duration of the thawing process and the ground being frozen. Herewith are the directions for thawing service pipes up to one and a half inches in diameter, which were prepared and sent out by the University of Wisconsin:

"'The current, which is required for thawing service pipes satisfactorily, is from 200 to 300 amperes. The source of current should have a pressure of not less than 50 volts. Where electric light lines carrying alternating currents are available, a transformer or transformers in parallel may be used as a source of current. It is very important that direct connection of pipes to house lines be avoided on account of danger of fire in which the house is placed by such connection. Where alternating currents are not available, continuous current feeder lines may be used, but these should be entirely separated from the distributing net work of conductors. The way in which the appliances should be connected when an alternating current is used with transformers is as follows: The secondary leads from the transformer should be quite large, such as No. 3 B. & S. gauge, or larger. In making connection to the pipes, one of the secondary leads should be taken into the house, to which the frozen service pipe leads, and contact made at that point by some form of metallic clamp or by simply giving the conductor two or three tight twists about the pipe at any point where the pipe is exposed or at a faucet in the house. The other secondary lead should be put in contact with the water system outside of the house and in a similar manner. This contact may be made at a hydrant or at an adjoining service box, or pipes in a neighboring house. When there are two houses near together, each with frozen service pipes, the two secondary leads may be connected to the pipes within these houses and both frozen service pipes thawed out at once. While the thawing process is going on, the faucet should be open in the house to which the service pipe leads. In one of the secondary leads should be inserted a water resistance, which consists, for convenience, of a bucket of water containing a bowlful of salt, and two sheet-iron or copper plates to which the ends of the severed lead are attached. This serves to control the current. In the primary leads from the electric light line to the transformer it is highly desirable to have a fuse in each lead, and an amperemeter. When all connections are made, the plates are placed in the bucket and are then moved towards each other until the amperemeter records a proper current. If the primary pressure is 1,000 volts and the secondary pressure 50 volts, the current should ordinarily approach 15 amperes. If the primary pressure is 2,000 volts, and the secondary pressure is 50 volts, the amperemeter reading should ordinarily approach 7.5 amperes. Water ordinarily begins to flow in a time not much less than ten minutes, or not greater than one hour. If the secondary current is quite close to 300 amperes the period seldom exceeds one-half hour. The frozen pipes are often split by the action of the frozen water, and these at once begin to leak when the ice is thawed away. For this reason it is desirable to have a plumber where he may be readily called to care for the leaky pipe. The electric current when properly used will not damage the pipes. It is desirable to watch brass and iron connections to lead or iron service pipes, as they sometimes heat on account of poor contact. If such heating appears to be excessive, the current may be reduced with a resulting increase in the duration of time for thawing. After the pipe has been thawed it is desirable to let the water run continuously for a considerable time, inasmuch as the ground all round the pipe is frozen, and the pipe is liable to freeze up again unless the water circulates.' In closing this paper let me give you an extract from an insurance paper, as to the financial result of this discovery: 'A slight estimate of the value of the invention of thawing out frozen pipes by electricity to underwriters can be found from the fact that in 1898, insurance companies paid out nearly $300,000 in losses caused by primitive methods of thawing out pipes.'"

SOUTH AFRICA, ITS PEOPLE AND TRADE.

ARTICLE I.

The obduracy of the Transvaal Boers and their president in refusing to concede the common rights of man to citizens not of their own race, is turning the attention of the civilized world to South Africa and its people. That quarter of the world possesses unusual interest to Canadians, not only from the standpoint of imperial politics, but from its commercial development and its possibilities as a field for Canadian trade. As a prelude to a review of the prospects for Canadian manufacturers and exporters, it will be well for the reader to know something of the causes of the present political complications.

The Cape of Good Hope, though discovered by Diaz, a Portuguese navigator, six years before Columbus landed in America, and though used as a port of call by the Portuguese for a century afterwards, it remained for two English captains, in the employ of the