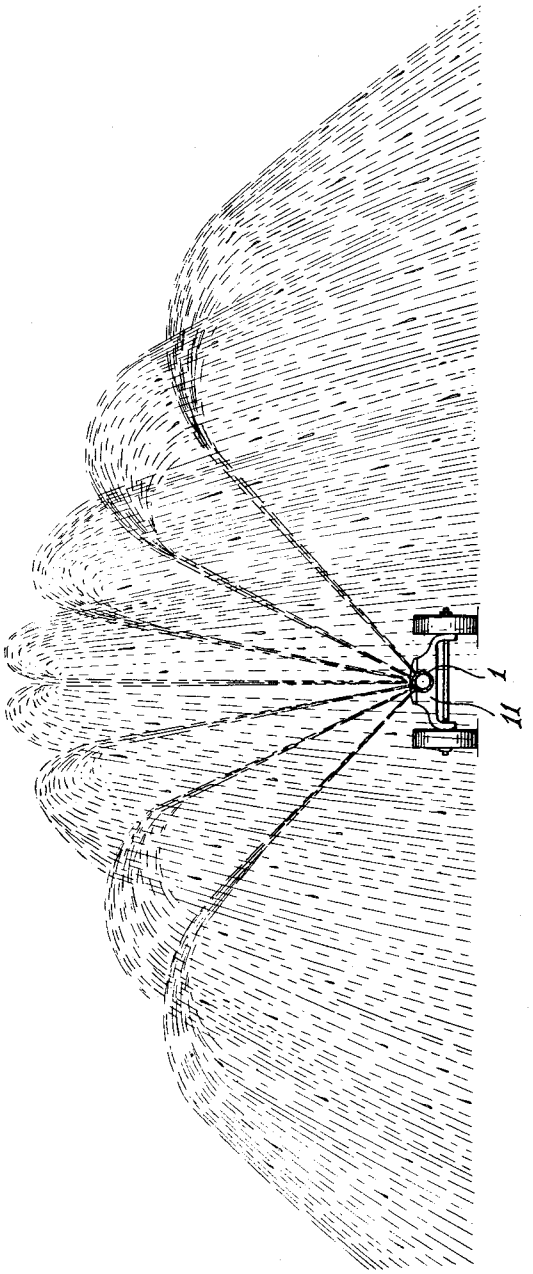
May 10, 1927. 1,628,118

W. H. COLES

LAWN SPRINKLING DEVICE

Filed Feb. 19, 1924 4 Sheets-Sheet 1

Fig. 1.




INVENTOR
Walter H. Coles
BY
ATTORNEY

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W. H. COLES

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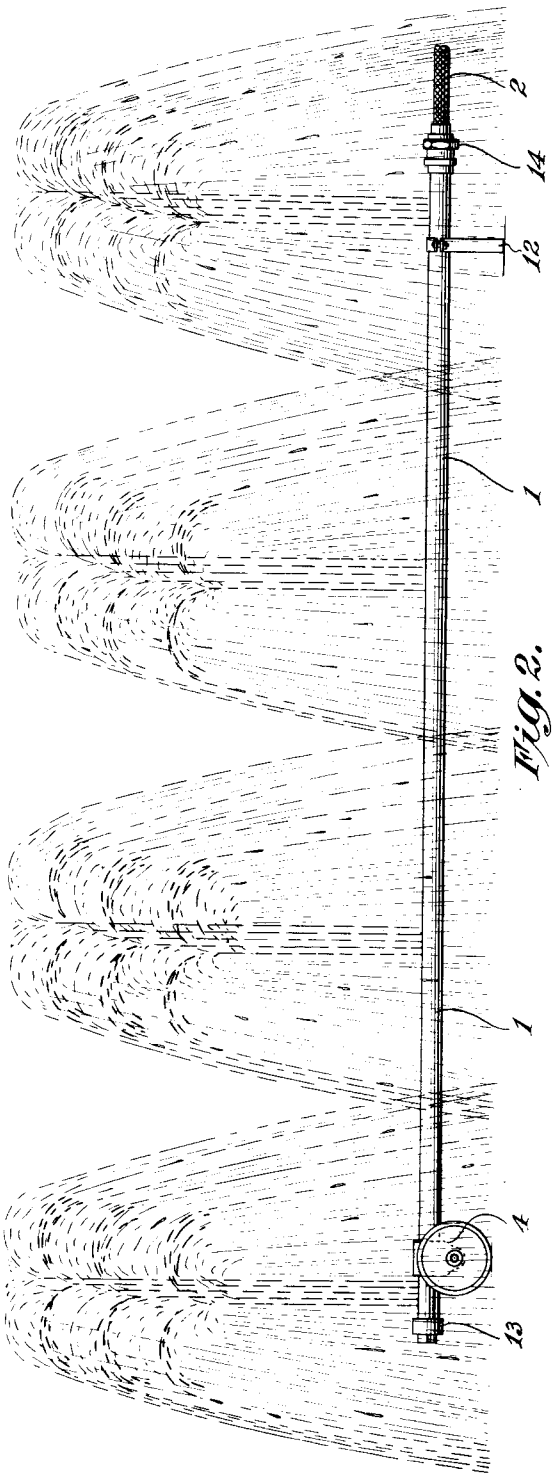


Fig. 2.

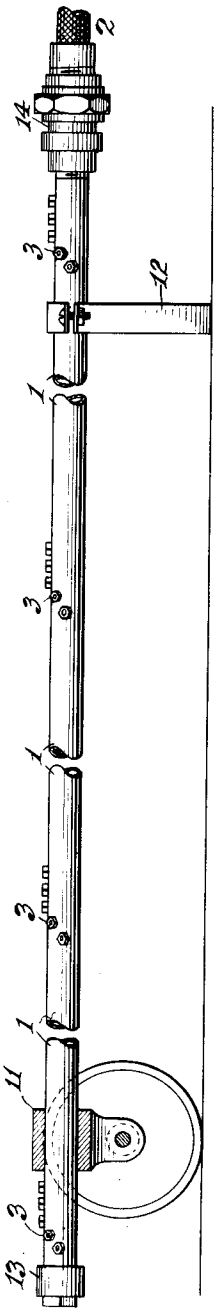


Fig. 3.

INVENTOR
Walter H. Coles
BY
Wm. V. Beeken
ATTORNEY

May 10, 1927. 1,628,118

W. H. COLES

LAWN SPRINKLING DEVICE

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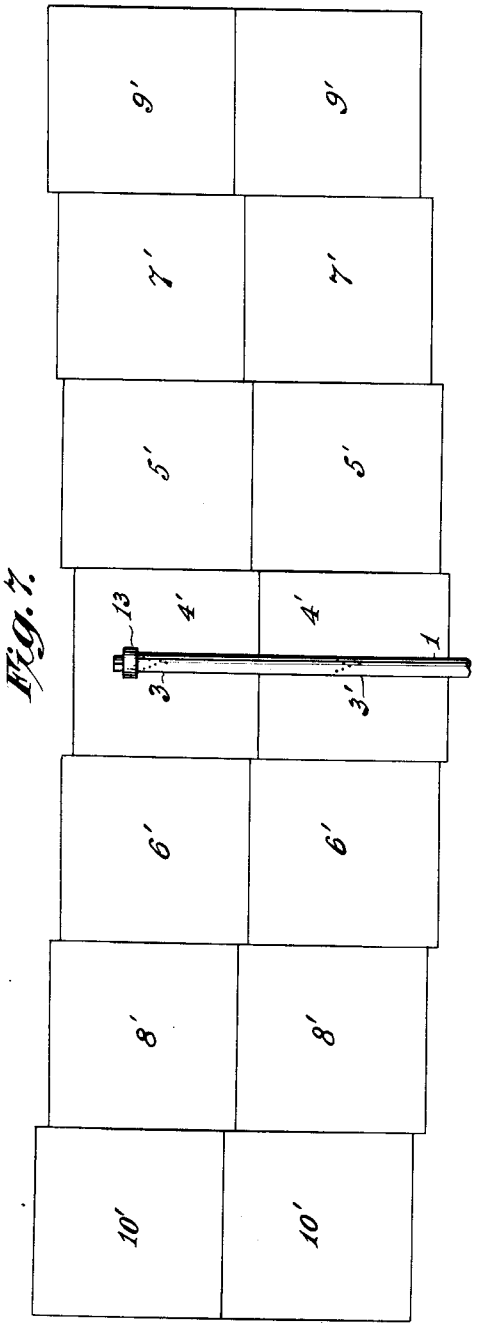


Fig. 7.

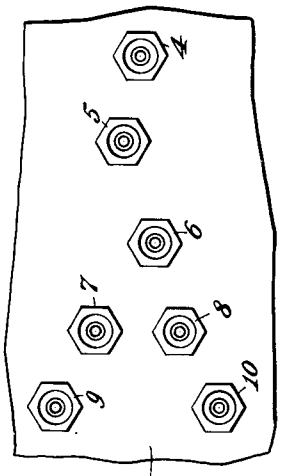


Fig. 6.

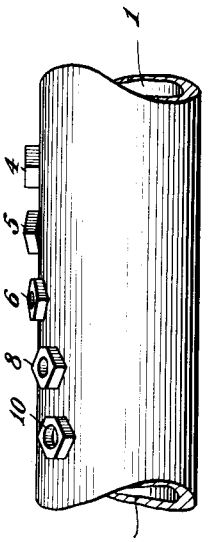


Fig. 5.

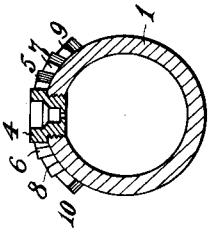


Fig. 4.

INVENTOR

Walter H. Coles

BY

ATTORNEY

May 10, 1927. 1,628,118

W. H. COLES

LAWN SPRINKLING DEVICE

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Fig. 8.

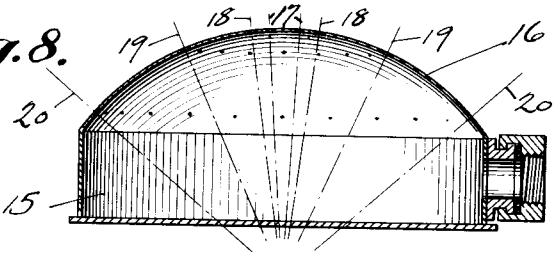



Fig. 9.

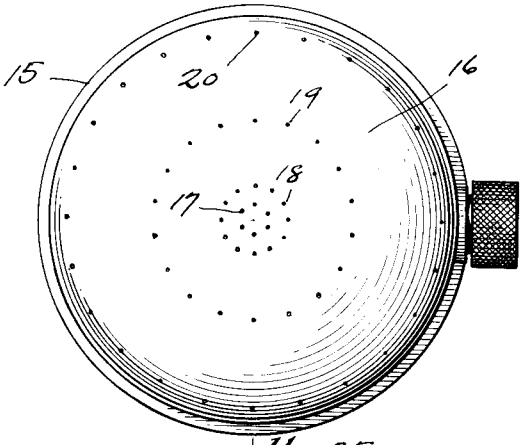



Fig. 10.

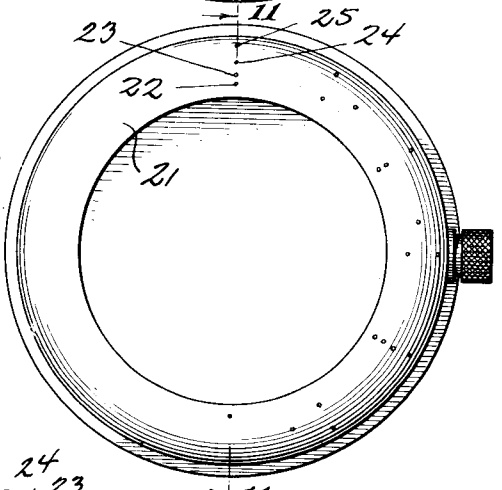



Fig. 12.

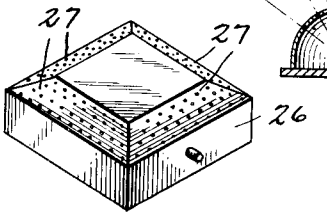
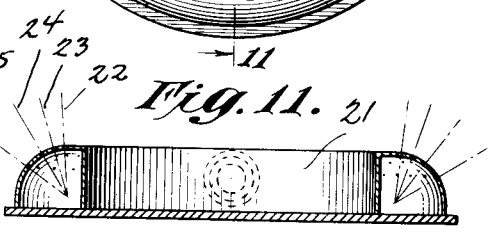



Fig. 11.




INVENTOR

Walter H. Coles

BY

Fred V. Beeken

ATTORNEY

Patented May 10, 1927. 1,628,118

# UNITED STATES PATENT OFFICE.

WALTER H. COLES, OF TROY, OHIO.

## LAWN-SPRINKLING DEVICE.

Application filed February 19, 1924. Serial No. 693,805.

This application is a continuation in part of my application filed October 20, 1916, Ser. No. 126,669.

This invention relates generally to irrigating apparatus and more particularly to that type of apparatus which is especially adapted to be used in sprinkling lawns and gardens.

The main object of this invention is to produce a device that will uniformly distribute water over the individual comparatively large areas supplied by the device, the watered areas having such formation that their edges can be readily made to conform to each other to thereby uniformly water a given larger area.

To this end, the invention consists in providing a substantially horizontal distributing pipe with groups of nozzles spaced apart along the pipe, the nozzles being adapted to project solid streams of water to a point where gravity becomes effective to break the streams into showers of rain-like spray. In order to uniformly distribute water laterally throughout the area supplied by a group of nozzles, one nozzle is so mounted as to project its stream of water vertically to thereby supply a small area of which the nozzle itself marks the center. On both sides of the vertical nozzle transverse the length of the pipe nozzles are mounted at such an angle to the vertical that the point at which gravity breaks the streams therefrom into spray is so located that the falling spray waters equal areas just outside the area watered by the spray from the vertical nozzle. Spaced from the two nozzles just described are two additional nozzles placed at a still greater angle with relation to their adjacent nozzles than were the first pair from the vertical nozzle. The result of this is that the streams projected from the second pair of nozzles break at the proper points to water areas just outside the areas watered by the first pair of nozzles. The last pair of nozzles is placed at a still greater angle from the second pair of nozzles to water areas just outside the areas watered by the second pair. Furthermore the angles which the last pair of nozzles make with the vertical are such that the spray projected therefrom reaches a maximum distance from the pipe; or, to state the problem differently, an arrangement of the nozzles at progressively increasing inclinations from the vertical will not produce a corresponding increase in the throw from the nozzles and to accomplish this there must also be an increase in the space between adjacent nozzles as they approach the horizontal or incline away from the vertical. The intervals at which the groups are spaced apart are such that the contiguous transverse margins of the areas sprayed by the different groups substantially coincide with each other. It will therefore be seen that a sprinkling device has been produced that is especially adapted to water a maximum area with great uniformity.

In the drawings, in which like reference characters are employed to designate like parts:

Fig. 1 is an end view of a device embodying the invention and showing the manner in which a group of nozzles distributes liquid, the pipe itself being shown in cross section.

Fig. 2 is a side elevation of the device showing the manner in which the nozzle groups co-operate to uniformly distribute the liquid.

Fig. 3 is a side elevation partly in section of a pipe unit showing the location of the nozzle groups.

Fig. 4 is a cross section of the pipe taken through one of the nozzles.

Fig. 5 is a side elevation of a nozzle group.

Fig. 6 is a development of a section of the pipe showing in effect a plan view of a nozzle group.

Fig. 7 is a diagrammatic view showing the manner in which water is distributed to all parts of the area supplied by the pipe.

Fig. 8 is a vertical sectional view of a modified form of the invention.

Fig. 9 is a plan view of Fig. 8.

Fig. 10 is a plan view of a second modified form of the invention.

Fig. 11 is a sectional view on the line 11—11 of Fig. 10.

Fig. 12 is a perspective view of a third modified form of the invention.

In the drawings 1 represents a distributing pipe unit which may be used singly or as

one of several sections joined together by flexible hose connections 2 to form a distributing pipe of any desired length. In order to effect a uniform distribution of the water from the pipe unit, the spray nozzles 3 are mounted in groups spaced apart at regular intervals along the upper side of the pipe as shown in Fig. 3 of the drawing.

The nozzles 3 are preferably adapted to project a substantially solid stream of water, or other liquid, to a point where gravity becomes effective to break the stream into a rain-like spray, or shower, of falling drops. In order to secure a uniform distribution of the liquid over the widest possible area, the nozzles of each group are preferably mounted in the relative positions indicated in Figs. 4, 5 and 6 of the drawing. It will be noted that the first nozzle 4 is mounted on a vertical radius so as to project a stream directly upward. This stream when reduced to a rain-like spray by the resistance of the air and the action of gravity will tend to moisten a plot of ground 4', as shown in Fig. 7, extending to equal distances on both sides of the pipe. The two nozzles 5 and 6 are radially mounted at equal distances on opposite sides of the vertical and in a staggered relation to prevent interference with each other. The angle which the nozzles 5 and 6 make with the vertical is comparatively small so that the points at which gravity and the resistance of the air become effective to break the stream into spray are such that the areas 5' and 6' moistened by the spray therefrom have their inner margins substantially coincident with the outermost margins of the central area 4' watered by the spray from the vertical nozzle 4. The nozzles 7 and 8 are radially mounted so as to form angles with the nozzles 5 and 6 that are greater than the angles formed by the nozzles 5 and 6 with the vertical. These angles are given such a value that the areas 7' and 8' watered by the spray from the nozzles 7 and 8 are substantially extensions of the contiguous areas 5' and 6' watered by the nozzles 5 and 6. Likewise the final set of nozzles 9 and 10 of each group is offset at still greater angles from the nozzles 7 and 8 so as to spray ground areas 9' and 10' merging with the extreme margins of the areas 7' and 8' supplied by the nozzles 7 and 8. In addition the angles made by the nozzles 9 and 10 with the vertical are such that the maximum distance to which water can be projected from the pipe is reached.

Thus it will be seen that the radially mounted spray nozzles comprising each of the groups bear such a progressively increasing angular relation to the vertical and to each other that the points at which the issuing streams break into spray are so spaced laterally from the pipe that distinct and separate contiguous areas are watered by the individual nozzles without substantial overlapping so that water is uniformly distributed over the entire area supplied by a group of nozzles. The manner in which the nozzles of a group co-operate in the distribution of the water is illustrated in Fig. 1 of the drawing.

The intervals separating the nozzle groups 3 are preferably such that the contiguous transverse margins of the areas sprayed by the different groups merge into each other, so that the area sprayed by the pipe unit as a whole, as well as the area sprayed by an individual group of nozzles, is uniformly sprinkled. The combination, therefor, of the angular relation to each other of the nozzles of each group and the intervals between groups is such that a maximum area of ground about the pipe is uniformly supplied with moisture.

The area over which water is thus distributed is not only relatively of large extent, but as has been already indicated, all portions of this area are being continuously supplied with water during the operation of the apparatus. Accordingly a maximum quantity of water can be distributed to all parts of a given area in a given time thereby greatly enhancing the efficient operation of the apparatus.

In order to facilitate the removal of the distributing pipe from place to place, each pipe section, or unit, is preferably mounted on a wheeled truck 11 at one end and a supporting standard 12 at the other as shown in Fig. 2 of the drawing. It will be obvious that the pipe units may be supported entirely by wheeled trucks or by supporting standards as may be found most desirable. With either form of mounting in which a wheeled truck is used the pipe can be lifted at one end and moved about wheelbarrow fashion from place to place to facilitate the sprinkling of a large area.

A cap 13 may be easily removed from the end of the pipe to provide for the attachment thereto of an additional section of pipe or of a connection from a water supply. A flexible hose connection 2 is preferably inserted between each two adjacent sections in a pipe line by means of couplings 14 to permit the flexure of the line to supply a curved or otherwise irregular area.

It is to be understood that the term "nozzles" as used in the description is intended to be comprehensive enough to include mere perforations in the distributing pipe; that the reference to a projection of the water to a maximum distance from the pipe is the longest possible throw to be obtained under normal conditions of the air, and that the diagrammatic showing of the distribution of the water in Fig. 7 is approximate only and not to be construed as

a precise showing either as to the form or size of the areas supplied by the individual nozzles. The use of two nozzles separated by a slight angular distance, instead of the single vertical nozzle shown, is also within the scope of the invention.

It will be apparent from the foregoing description that a sprinkling device has been provided that is especially adapted to uniformly water the widest possible individual areas of such formation that they can be readily produced in combination to uniformly cover a given larger area.

In Figs. 8 and 9 are shown a modified form of the invention. As here indicated, the distribution pipe need not be a pipe in the narrow meaning of the word. The distributing member here is a container 15 having preferably a dome top 16. In this dome top are a series of nozzles or perforations 17, 18, 19 and 20, the circumferential space between the adjacent series of nozzles increasing as the nozzles are progressively inclined away from the vertical.

In Figs. 10 and 11 the pipe or distributing member is in the form of a ring 21 in which the spaces between the four nozzles 22, 23, 24 and 25 increase as the nozzles are progressively inclined away from the vertical.

In Fig. 12 distributing member 26 is a container having preferably flat sloping sides 27 in which the nozzles are arranged as described in connection with the other figures.

I claim:

1. An irrigating apparatus comprising: a non-oscillating substantially horizontal distributing member having an upper surface sloping from the vertical, and a plurality, greater than two, of nozzles in the surface of said member at one side of and inclined at different angles from the vertical and so disposed that the space between adjacent nozzles increases as the nozzles are progressively inclined away from the vertical.

2. An irrigating apparatus comprising: a non-oscillating substantially horizontal distributing member having an upper surface sloping from the vertical, and a plurality, greater than two, of nozzles extending at different angles from said surface at one side of the vertical and so disposed that the space between adjacent nozzles increases as the nozzles are progressively inclined away from the vertical.

3. An irrigating apparatus comprising: a non-oscillating substantially horizontal distributing member having an upper surface sloping from the vertical, and a plurality, greater than two, of nozzles in the surface of said member at one side of and inclined at different angles from the vertical, one of which is set at such an angle to the vertical as to moisten an area located at a maximum distance laterally from said member, and the remaining nozzles so disposed that the space between adjacent nozzles decreases as the nozzles are progressively inclined toward the vertical.

4. An irrigating apparatus comprising: a non-oscillating substantially horizontal distributing member having an upper surface sloping from the vertical, and a plurality, greater than two, of nozzles in the surface of said member at one side of the vertical and so inclined and spaced as to throw a plurality of streams at progressively and equally increasing distances laterally from the member.

5. An irrigating apparatus comprising: a non-oscillating substantially horizontal distributing pipe, a plurality, greater than two, of radial nozzles, at one side of the vertical, so disposed circumferentially of the upper surface of said pipe that the circumferential space between adjacent nozzles increases as the nozzles are progressively inclined away from the vertical.

6. An irrigating apparatus comprising: a non-oscillating substantially horizontal distributing pipe, a plurality, greater than two, of radial nozzles, at one side of the vertical, one of which is set at such an angle to the vertical so as to moisten an area located at a maximum distance laterally from the pipe, and the remaining nozzles so disposed circumferentially of the upper surface of said pipe that the circumferential space between adjacent nozzles decreases as the nozzles are progressively inclined toward the vertical.

7. An irrigating apparatus comprising: a non-oscillating and substantially horizontal distributing pipe, and a plurality of groups of nozzles, said groups disposed relatively remotely with respect to each other along said pipe, and each group consisting of a plurality, greater than two, of radial nozzles at one side of the vertical relatively closely adjacent to each other and so disposed circumferentially of the upper surface of the pipe that the circumferential space between adjacent nozzles increases as the nozzles are progressively inclined away from the vertical.

8. An irrigating apparatus comprising: a non-oscillating and substantially horizontal distributing pipe, and a plurality of groups of nozzles, said groups disposed relatively remotely with respect to each other along said pipe, and each group consisting of a plurality, greater than two, of radial nozzles at one side of the vertical relatively closely adjacent to each other and arranged substantially in spiral formation and so disposed circumferentially of the upper surface of the pipe that the circumferential space between adjacent nozzles increases as the nozzles are progressively inclined away from the vertical.

9. An irrigating apparatus comprising: a non-oscillating and substantially horizontal distributing pipe, and a plurality, greater than two, of nozzles at one side of the vertical spaced unequally circumferentially of the upper surface of the pipe to throw a plurality of streams at progressively and equally increasing distances laterally from the pipe.

Signed at Troy, in the county of Miami and State of Ohio this 16th day of February, 1924.

WALTER H. COLES.