March 21, 1944. E. S. HARGREAVES ET AL 2,344,610

APPARATUS FOR MARKING THE SURFACE OF ELECTRIC CABLES OR SIMILAR ARTICLES

Filed May 10, 1943 2 Sheets-Sheet 1

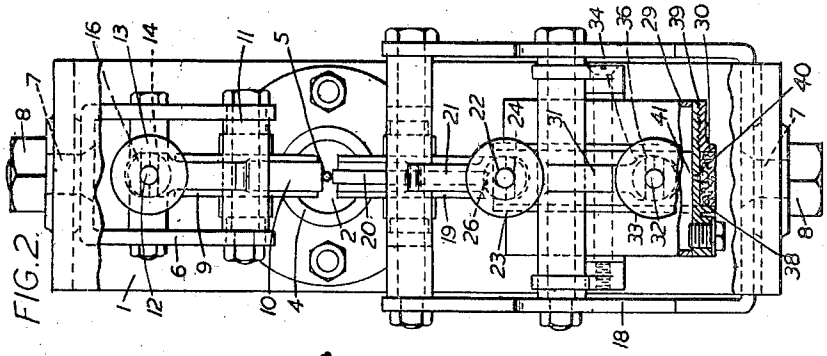


FIG. 2.

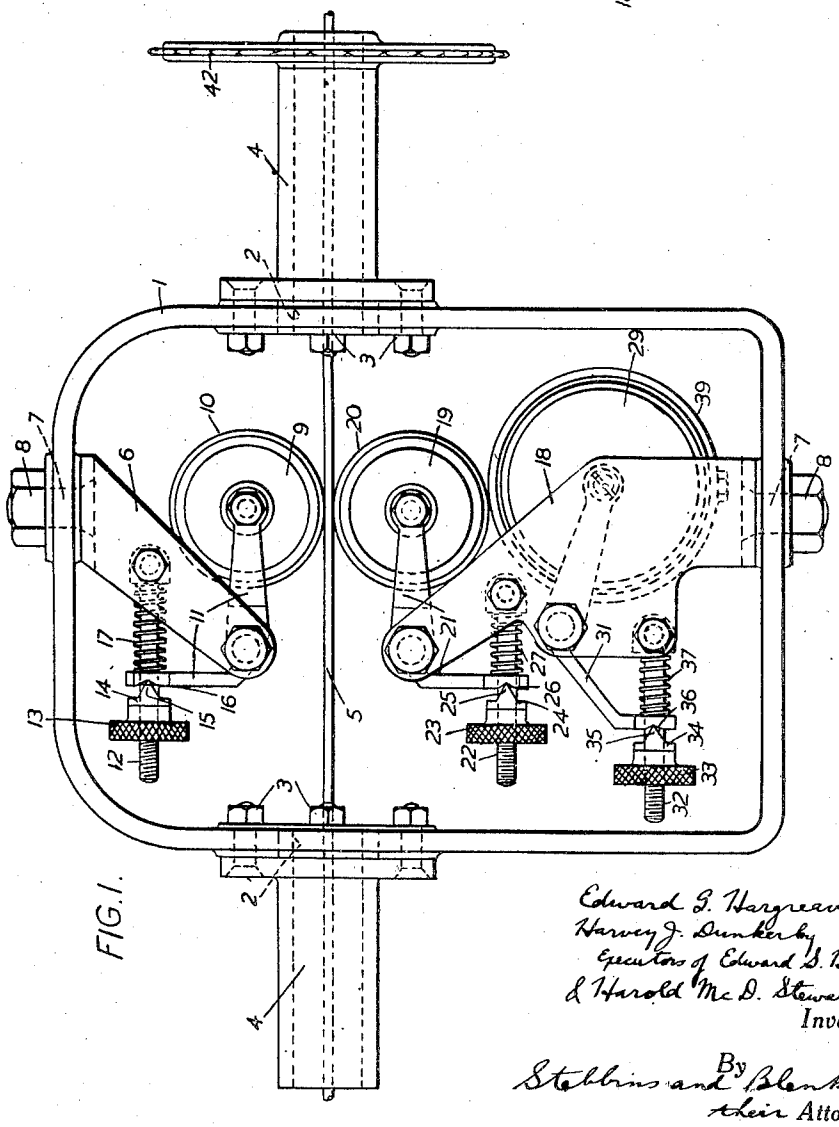


FIG. 1.

Edward S. Hargreaves &
Harvey J. Dunkerley
Executors of Edward S. Hargreaves
& Harold Mc D. Stewart
Inventors

By Stebbins and Blenko
their Attorneys

March 21, 1944. E. S. HARGREAVES ET AL 2,344,610

APPARATUS FOR MARKING THE SURFACE OF ELECTRIC CABLES OR SIMILAR ARTICLES

Filed May 10, 1943 2 Sheets-Sheet 2

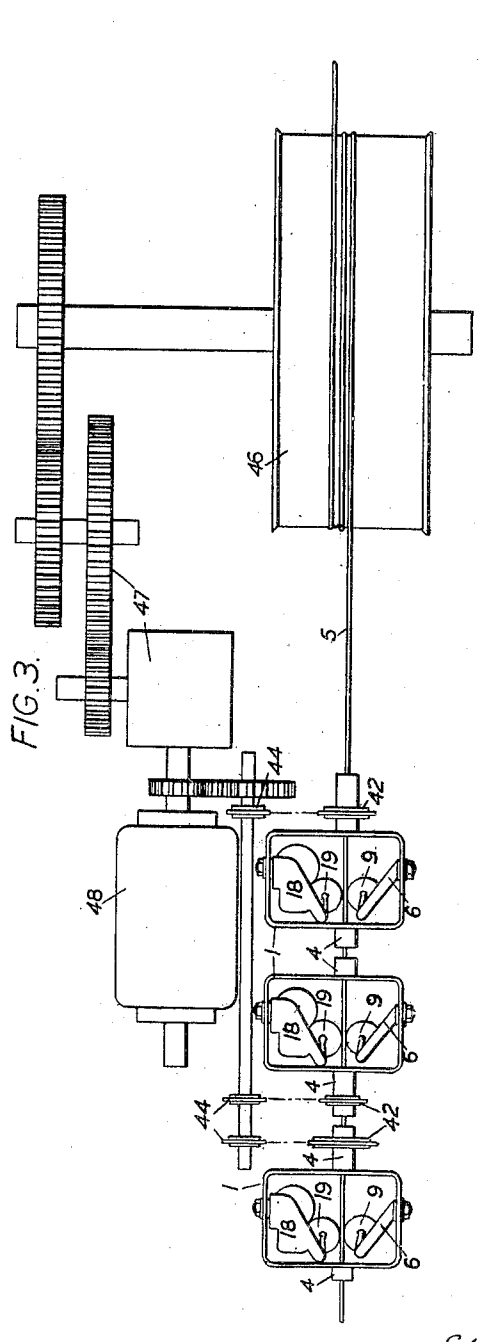


FIG. 3.

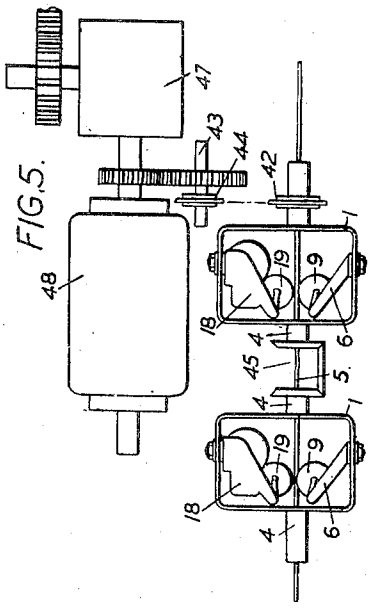


FIG. 5.

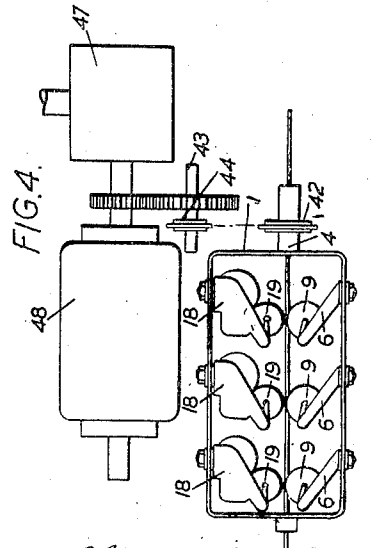


FIG. 4.

Edward S. Hargreaves
Harvey J. Dunkerley, Executors of
Edward S. Hargreaves &
Harold McD. Stewart
Inventors

By Stebbins and Blenko
their Attorneys

Patented Mar. 21, 1944 2,344,610

UNITED STATES PATENT OFFICE

2,344,610

APPARATUS FOR MARKING THE SURFACE OF ELECTRIC CABLES OR SIMILAR ARTICLES

Edward Spencer Hargreaves, deceased, late of Rainhill, England, by Edward Gordon Hargreaves, Saint Helens, England, and Harvey John Dunkerley, Crookham, England, executors, and Harold MacDonald Steward, Liverpool, England, assignors to British Insulated Cables Limited, Prescot, England, a British company

Application May 10, 1943, Serial No. 486,399
In Great Britain June 6, 1942

8 Claims. (Cl. 101—36)

This invention relates to apparatus for applying marking at frequent intervals, or continuously, in the length, to the surface of an electric cable or of some similar article. Such marking may be required for distinguishing between different articles which are otherwise similar, or labelling the article with the marker's name, or its rating, or other information, or for ornamentation.

The apparatus provides for the application of marking to a long cylindrical body of circular or approximately circular cross-section, hereinafter referred to for convenience as a cable, in a path (or paths) which progresses round and along the cable. Such a path will for convenience be termed a helical path although, in the case of a cable that is not of circular cross-section, the development of the surface of the cable will not result in the path becoming a right line. The marking is effected by means of a roller (or rollers), which has on its periphery an appropriate marking surface, and which runs with this periphery in contact with the surface of the cable as the cable travels forward longitudinally. The marking roller is mounted on the skew in a carrier, which is rotatable about the cable. The angle of skew and the relation between the speed of rotation of the carrier and the linear speed of travel of the cable are such that the marking roller follows a helical path about the cable without appreciable slipping between the marking surface and the cable. In this arrangement the line of marking is tangential to the surface of the cable in a plane which does not contain the axis of the cable and is not perpendicular to a plane containing that axis, but which is in some intermediate angular position. It is preferred to make the marking roller adjustable so as to vary this angular position through a range by turning the roller about a line extending radially from the axis of the cable through the mean point of contact of the periphery of the roller with the cable surface to bring the axis of the marking roller at right angles to the line of marking, that is, at right angles to the direction of movement of the mean point of contact over the cable surface. This direction of movement is governed by the relation between the speed of travel of the cable and the speed of rotation of the carrier. It will be understood, therefore, that any adjustment of the angular position of the marking roller with the object of obtaining a helical line of marking of a different angle must be accompanied by a corresponding adjustment of the relation between the speed of travel of the cable and the speed of rotation of the carrier.

A particular advantage of this method of marking is that it permits of applying a pattern of considerable transverse width to the surface of a cable of small diameter, that is to say, of a diameter equal to or less than the width of marking. This cannot be done effectively if the axis of the roller is at right angles to the axis of the cable, since, even if the roller surface is made exceptionally soft, or is shaped to fit the cable, substantial slipping between the surfaces while marking is taking place must occur, so that the marking is blurred and ineffective. By placing the marking roller on the skew, so that a helical marking is obtained, the transverse curvature of the surface to be marked, in the region in which marking takes place, is substantially reduced, so that effective marking can be obtained.

Preferably the carrier also carries a support or backing-up member, which makes contact with the cable at a point opposite to that at which the marking roller is applied, and thereby holds the cable in position against the pressure of the marking roller.

The marking may be done simply by impressing. It may also be done by the use of ink or other matter, which is applied to the surface of the marking roller and transferred by it to the cable. For this an additional roller, for convenience referred to as an inking roller, is also mounted in the carrier so that it runs in contact with the marking roller. It is preferably made as a hollow container so that the supply of marking liquid may be contained within it and fed outward through an aperture or apertures in its periphery on to an appropriate surface by which it is applied to the marking surface on the marking roller.

By way of example several forms of cable marking apparatus constructed in accordance with the invention will now be described with the aid of the accompanying drawings, wherein,

Figure 1 is a side elevation of a marking device for applying a single line of marking,

Figure 2 is an end elevation of the device shown in Figure 1,

Figure 3 is a diagrammatic plan showing a number of marking devices arranged in tandem and each arranged to be driven in the same direction and at speeds proportional to the speed of travel of the cable,

Figure 4 is a diagrammatic plan view of a

marking device comprising a carrier with three sets of marking and support rollers, and

Figure 5 is a diagrammatic plan view of two marking devices arranged to be driven in opposite directions at a speed proportional to the speed of travel of the cable.

Referring now more particularly to Figures 1 and 2, it will be seen that the marking device comprises a frame 1 in the form of a rectangle with rounded corners, having in two opposite sides holes 2 which are in alignment with each other. Attached to these sides by bolts 3 are hollow trunnions 4 which are also in alignment with the holes 2. These trunnions serve to support the carrier in bearings (not shown). The trunnions also serve for the passage of the cable 5 to be marked. The frame is mounted appropriately, usually in association with a machine which is performing some other operation on the cable so that marking takes place as the cable enters or leaves the machine performing that other operation.

On one of the sides of the frame that lie parallel with the axis of rotation of the frame is mounted a bracket 6 of U-shape. The bracket is clamped to the frame by a bolt 7 passing through the frame and the centre of the bracket. When the nut 8 is slackened, the bolt serves as a pivot about which the bracket may be turned. Thus, the bracket may be clamped to the frame in any desired angular setting within a range. The axis about which this angular adjustment takes place is radial to the axis of rotation of the frame. The bracket 6 carries a support roller 9 which is intended to have its periphery in contact with the cable at a point opposite to that at which marking is to take place, when the axis of the cable coincides or approximately coincides with the trunnion axis. The support roller is of metal with a circumferential groove which receives a rubber ring 10 which serves as a resilient support surface. The support roller is rotatably supported in the clevis end of a bell crank lever 11 which is pivotally supported in the bracket 6 and is adjustably supported by a tension arm acting on the other arm of the bell crank lever. This tension arm has the form of an eye bolt 12 pivotally secured to the U-shaped bracket 6, and carrying a nut 13 and a washer 14 with a knife edge 15 which enters a shallow V-shaped groove 16 in the free arm of the lever 11 and forms an adjustable abutment for that arm of the lever. By adjusting the position of the nut 13 the surface of the support roller 9 may be moved nearer to or further from the axis of the cable. This adjustment allows the marking device to deal with different sizes of cable and provides for the obtaining of the desired intensity of pressure on the cable. It will be noticed that the roller 9 is so supported in its bracket 6 that the axis of adjustment of the bracket in the carrier passes through the axis of the roller and through the region of contact with the cable. Movement in either direction of the roller from the mean position shown will move the roller axis away from the pivot axis of the bracket but this displacement will be small because the distance of the pivot axis of the bell crank lever from the trunnion axis is made approximately equal to the radius of the roller.

Directly opposite the bracket 6, and similarly mounted for angular adjustment about the same axis, is a second and larger U-shaped bracket 18, the limbs of which extend from the opposite side of the frame towards the trunnion axis and the limbs of the bracket 6. At its outer end, this bracket carries the marking roller 19, which is fitted with a rubber ring 20 carrying the desired markings in the form of a raised pattern. The roller 19 is mounted in a similar manner to the support roller 9, that is, on a bell crank lever 21, the position of which is likewise adjusted by means of an eye bolt 22, a washer 24 with a knife edge 25 engaging in a shallow V-shaped groove 26 in the lever 21, and a nut 23. The bracket 18 also carries an inking roller, designated 29. This roller is mounted on a bell crank lever 31, the angular position of which is controlled, in the same manner as are the bell crank levers 11 and 21, by a nut 33 and washer 34 on an eye bolt 32 pivotally anchored to the bracket 18, the washer having a knife edge 35 engaging in a shallow V-shaped groove 36 on the bell crank lever 31. By adjustment of the position of the bell crank lever 31, the inking roller can be moved to obtain the correct degree of contact between its surface and the marking surface 20 of the marking roller 19, whatever the position of the latter within the region of adjustment provided for it.

The inking roller 29 has the form of a hollow drum round the circumference of which is a band 30 of felt located between a fixed collar 38 and a detachable collar 39. In the circumferential surface of the roller that lies under the felt band is a shallow groove 40 communicating by a small hole 41 with the interior of the roller which forms a reservoir which can be filled with marking liquid, which escapes through the hole 41 and fills the felt and is thereby transferred to the raised part of the pattern on the rubber periphery 20 of the marking roller.

A spring 17 between the head of the eye bolt 12 and the arm of the bell crank lever 11, and corresponding springs 27 and 37 acting on levers 21 and 31 respectively, cause the rolls to move outwards as the nuts 13, 23 and 33 are slackened, whatever be the angular position of the carrier. Thus the rollers 9 and 19 are held open and the insertion of a new length of cable is facilitated.

The device shown in Figures 1 and 2 is an example of device for the production of a single helical line of marking. Where more than one line of marking is to be applied to the cable, this can be done by means of a number of separate similar marking devices, each comprising a rotatable carrier with a marking roller and a support roller, as shown in Figure 3. All the carriers may be driven at the same speed so as to produce helical lines of marking of the same pitch, or they may be driven at different speeds, for instance, by fitting driving sprockets 42 of different sizes and driving from a common lay shaft 43 by chain drives 44. On the other hand, two marking devices may be employed of which the carriers are driven in opposite directions. Such an arrangement is shown in Figure 5, which shows a carrier provided with a chain drive 44 and a second carrier driven in the opposite direction by the first carrier through a double bevel drive 45. This arrangement will give interlaced lines of marking. Alternatively, a single carrier may be fitted with an appropriate number of printing and support rollers and inking rollers (if marking is to be done by means of ink). The marking rollers for the several lines of marking may be placed either side by side, if the lines are narrow as, for instance, two simple lines of different colours, or they may be separate and positioned one behind the other in a long carrier, either as shown in Figure 4 or with the axes of adjustment of

the roller brackets 6 and 18 lying at an angle to one another, so as to operate in succession upon the cable.

For the sake of clarity and simplicity the brackets 6 and 18 are shown in such positions that the axes of the rolls they support lie parallel with one another and at right angles to the axis of rotation of the frame, but it will be appreciated that before putting the marking apparatus into operation, the support roller 9 and marking roller 19 will be slewed round in opposite directions until their axes lie at angles to the axis of rotation of the frame that are appropriate to the relationship between the speed of rotation of the frame and the linear speed of the cable through the apparatus, so that a helical line of marking is applied to the cable without appreciable rubbing taking place between the surface of the marking roller and that of the cable. During the marking operation, the relationship between speed of rotation of the frame and speed of the cable is preferably maintained constant and appropriate to the setting of the rollers by using a common drive for the frame and the draw-off capstan wheel or other means controlling the passage of cable through the marking apparatus. An example of such a drive is shown diagrammatically in Figure 3. Here the cable 5 is drawn through the three marking devices by a capstan 46 driven through a train of gears 47 by an electric motor 48 which also drives the lay shaft 43 from which the chain drives 44 to the three carriers are taken.

It will be seen that the improved marking devices, instead of providing helical lines of marking or, in the case of the apparatus shown in Figure 3, in addition to providing such lines, may give lines of marking parallel with the axis where these are required. This would be done by setting the axes of the rollers at right angles to the axis of the cable (that is, as shown in the drawings) and locking the carrier against rotation.

What we claim as our invention is:

1. Apparatus for applying marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, at frequent intervals, or continuously, along the length of the article, as it travels therethrough, comprising a carrier, means for rotating the carrier about the article to be marked, and a roller with a peripherally extending marking surface mounted on the skew in said carrier with its periphery in contact with the surface of the article, the angle of skew and the relation between the speed of rotation of the carrier and the linear speed of travel of the article being such that the marking roller follows a helical path about the article without appreciable slipping between the marking surface and the article.

2. Apparatus for applying marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, at frequent intervals, or continuously, along the length of the article, as it travels therethrough, comprising a carrier, means for rotating the carrier about the article to be marked, and a roller with a peripherally extending marking surface mounted on the skew in said carrier with its periphery in contact with the surface of the article and its axis at right angles to the direction of movement of the mean point of contact of its periphery over the surface of the article.

3. Apparatus for applying marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, at frequent intervals, or continuously, along the length of the article, as it travels therethrough, comprising a carrier, means for rotating the carrier about the axis of the article, and a roller with a peripherally extending marking surface mounted in said carrier with its periphery in contact with the surface of the article, said roller being capable of angular adjustment about a line radial to the axis of the article and passing through the mean point of contact of the periphery of the marking roller with the surface of the article.

4. Apparatus for applying marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, at frequent intervals, or continuously, along the length of the article, as it travels therethrough, comprising a carrier, means for rotating the carrier about the article to be marked, a roller with a peripherally extending marking surface mounted on the skew in said carrier with its periphery in contact with the surface of the article, a support member mounted in said carrier and making contact with the article at a point opposite the point of contact between the article and the marking roller, the angle of skew and the relation between the speed of rotation of the carrier and the linear speed of travel of the article being such that the marking roller follows a helical path about the article without appreciable slipping between the marking surface and the article.

5. Apparatus for applying fluid to the surface of an elongated article of circular or approximately circular cross-section to form a helical line of marking on the article as it travels therethrough, comprising a carrier, means for rotating said carrier about the article to be marked, a roller with a peripherally extending marking surface mounted on the skew in said carrier with its periphery in contact with the surface of the article, and a second roller also mounted on the skew in said carrier with its axis parallel to that of first said roller and running in contact with the marking surface of first said roller and applying marking fluid thereto, the angle of skew of said rollers and the relation between the speed of rotation of said carrier and the speed of longitudinal travel of the article being such as to avoid appreciable slipping between the marking surface and the article.

6. Apparatus for applying a helical line of marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, comprising a carrier rotatably supported on hollow trunnions through which the article to be marked is drawn, a marking roller and a support roller mounted in said carrier on opposite sides thereof so as to be capable of limited angular adjustment about a common axis which is normal to and intersects the trunnion axis and passes through, or close to, the axis of each of said rollers and through the region of its contact with the article to be marked, to suit the relation between speed of rotation of said carrier and linear speed of travel of the article, and means for adjusting said rollers to a limited extent in a direction approximately parallel to the axis of angular adjustment, to suit the size of article.

7. Apparatus for applying a helical line of marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, as it travels therethrough, comprising a carrier supported on hollow trunnions, a pair of brackets on diametrically oppo-

site sides of the axis of said carrier, means securing said brackets to said carrier in a manner permitting independent angular adjustment thereof about a common axis normal to and intersecting the trunnion axis, a pair of bell crank levers pivotally supported one in each of said brackets, a marking roller rotatably supported at one end of one of said levers and a support roller rotatably supported at one end of the other of said levers, the distance of the pivot axis of each said bell crank lever from the trunnion axis approximating to the radius of the roller which the lever carries, and the distance of the pivot axis from the said common axis of adjustment approximating to the distance between the pivot axis and the axis of the roller, and means for controlling in an adjustable manner the angular position of each of said bell crank levers in its bracket, thereby to adjust the intensity of pressure of the marking and support rollers on the article.

8. Apparatus for applying a helical line of marking to the surface of a cable or other elongated article of circular or approximately circular cross-section, as it travels therethrough, comprising a carrier rotatably supported on hollow trunnions, a pair of brackets on diametrically opposite sides of the carrier, means securing said brackets to said carrier in a manner permitting independent angular adjustment thereof about a common axis normal to and intersecting the trunnion axis, a pair of bell crank levers pivotally supported one in each of said brackets, a marking roller rotatably supported at one end of one of said levers and a support roller rotatably supported at one end of the other of said levers, the distance of the pivot axis of each bell crank lever from the trunnion axis approximating to the radius of the roller which the said lever carries and the distance of the pivot axis from the said common axis of adjustment approximating to the distance between the pivot axis and the axis of the roller, a third bell crank lever, pivotally supported in the marking roller bracket, an inking roller rotatably supported at one end of the last said bell crank lever with its axis parallel to the axis of said marking roller, and means for controlling in an adjustable manner the angular position of each of said bell crank levers in its bracket independently of the others, whereby to control the intensity of pressure of the marking and support rollers on the article and of the inking roller on the marking roller.

EDWARD GORDON HARGREAVES.
HARVEY JOHN DUNKERLEY.
Executors of the Estate of Edward Spencer Hargreaves, Deceased.
HAROLD MacDONALD STEWARD.