A floor mopping appliance for mopping floors with a damp pad or cloth, comprising a mopping roller enveloped by a mopping pad or a band-shaped floor mopping cloth which runs endlessly over rollers or from one to a second spool and bears on the working surface underneath a mopping shoe or roller. The mopping roller and its enveloping mopping pad or the band-shaped floor mopping cloth is intermittently advanced during the mopping operation to bring a previously unused portion of the mopping pad or mopping cloth into contact with the working surface at every or any selectable forward working stroke of the appliance.

4 Claims, 39 Drawing Figures
The invention relates to an appliance for mopping floors with a damp mop means. A long established conventional method of cleaning floors to remove moist or dried dirt is to use a long-handled scrubbing brush which has a rough adherent surface and around which a damp floor cloth is wrapped. By pushing the long-handled scrubber to and fro by hand the damp cloth dissolves and detaches dirt from the floor, the greater part being taken up and absorbed by the cloth. When the cloth itself is dirty, it is taken off the brush, washed and wrung out in a bucket of water. This method does not give high quality results since only the first stroke of the long-handled scrubber, when the cloth is still clean, is actually capable of removing the dirt, each subsequent stroke of the scrubber redistributing some of the dirt previously taken up, and smearing it over the surface that is to be cleaned.

The method of cleaning with a scrubber and mop cloth is also not satisfactory from the point of view of working technique, since the mopping cloth must be taken off the brush at short intervals, rinsed and wrung again and again. This requires the expenditure of much unproductive effort and time, and the cleaning personnel must continually put their hands into the dirty water.

Apparatus have already been proposed which seek to mitigate the latter objections by replacing the scrubbing brush of the appliance with an absorbent pad that can be squeezed out with the aid of an operating lever which is attached to the handle of the appliance and actuates a flap for rinsing and squeezing the pad without any need for the user to bend down; an example of such an appliance is German Patent Specification No. 854,077. However, the capacity of the pad for holding a liquid and hence for taking up dirt is even less than that of a floor cloth or mop so that this appliance requires even more frequent cleaning than a floor cloth.

Cleaning machines are also known which make use of an endless floor cloth which continuously runs through a water bath and wringing rollers. However, such machines are heavy and difficult to manipulate.

A possible solution of the contemplated problem is suggested in German Patent Specification No. 943,010 and takes the form of a cleaning machine containing a reversing rewinding cloth. The machine is intended for polishing floors, however and it lacks facilities which would permit a user to feed fresh parts of the cloth into working position whilst the appliance is being used.

The very fact that even in the cleaning service industry the employment of scrubbing brushes and mopping cloths is still the rule proves that nothing has as yet been found to improve upon this old fashioned method.

It is the object of the present invention to provide a mopping appliance which will eliminate the shortcomings of prior proposals with regard to the quality of the work that can be performed and the efficiency of its method of use.

An appliance according to the present invention incorporates an absorbent mopping pad on a mopping roller or a mopping floor cloth in the form of a band which envelops a mopping head or roller, and which is intermittently advanced during each stroke of the appliance to bring a fresh and clean part of the dirt-absorbing mopping pad or cloth into operation for each working stroke. This avoids the necessity of frequently having to clean a mopping cloth or absorbent pad as required in the conventional method and at the same time the quality of the work and the speed with which it can be accomplished are substantially improved.

A band-shaped floor cloth may either be endless and run over rollers or it may be of finite length and intermittently withdrawn from a take-off spool for clean cloth and rewound on a second spool for taking up the dirty cloth. Washing and wringing in a cleaning fluid may be effected in the case of a mopping roller provided with an absorbent enveloping pad by rolling the roller to and fro on a screen or by removing the dirty moisture by centrifugal spinning, and in the case of appliances equipped with a floor cloth in the form of a band, by passing the band through a cleaning fluid and running it with the application of pressure over one or more washing and wringing rollers which may either form part of a cleaning appliance or be simply inserted into a cleaning container or they may already be present in a separate container. This means that the mopping appliance need not be inserted into a cleaning appliance, washed and wrung out until the entire length of the floor cloth band has been used and soiled. Moreover, the cleaning process may be partly or wholly mechanised. When cleaning has been completed the floor mopping appliance is immediately ready for re-use.

Various embodiments are shown by way of example in the accompanying generally schematic drawings of which:

FIG. 1 is a part-sectional side view of a first embodiment of mopping appliance;
FIG. 2 is an end view of the appliance of FIG. 1;
FIG. 3 shows a pile and screen used for washing out the appliance of FIG. 1;
FIG. 4 is a view similar to FIG. 3 showing the screen lifted;
FIG. 5 is a part-sectional side view of a second embodiment of mopping appliance;
FIG. 6 is an end view of the appliance of FIG. 5;
FIG. 7 is a part-sectional side view of a device for washing out a mopping appliance;
FIG. 8 is a part-sectional front view of the device of FIG. 7;
FIG. 9 is a front view of a third embodiment of mopping appliance;
FIG. 10 is a part-sectional side view of the appliance of FIG. 9;
FIG. 11 is a section on line XI—XI in FIG. 9;
FIG. 12 is a diagrammatic side view of a device for use in washing out the mopping appliance of FIGS. 9 to 11;
FIG. 13 is a side view of an alternative arrangement for washing out and wringing the mopping appliance of FIGS. 9 to 11;
FIG. 14 is a part-sectional side view of an alternative mounting of working roller;
FIG. 15 is an end view of the roller of FIG. 14;
FIG. 16 is a diagrammatic side view of a fourth embodiment of mopping appliance;
FIG. 17 is a diagrammatic side view of a fifth embodiment of mopping appliance;
FIG. 18 is a diagrammatic side view of a sixth and the preferred embodiment of mopping appliance including a backwinding floor cloth band held in a magazine;
FIG. 19 shows the appliance of FIG. 18 with the magazine separated from the remainder of the appliance;
FIG. 20 is a side view of a seventh embodiment of a mopping appliance again including a backwinding floor cloth band held in a magazine; FIG. 21 is a rear view of the appliance of FIG. 20; FIG. 22 is an exploded view of the appliance of FIG. 20; FIG. 23 represents an automatic washing out machine; FIG. 24 illustrates a stage in the washing out of a magazine as in FIG. 18 in an automatic washing out machine; FIG. 25 is a view similar to FIG. 24 but illustrating a magazine as in FIG. 22; FIG. 26 is a part-sectional side view of an eighth embodiment of mopping appliance; FIG. 27 is an end view of the appliance of FIG. 26; FIG. 28 is a view similar to FIG. 26 showing the appliance in condition for being washed out; FIG. 29 illustrates the modes of use of the appliance of FIGS. 26 to 28; FIGS. 30 and 31 illustrate respectively the removal of and the replacement of the mopping roller of the appliance of FIGS. 26 to 28; FIG. 32 is a part-sectional side view of a ninth embodiment of mopping appliance, shown being washed out in a pail; FIGS. 33 and 34 are respectively a part-sectional side view and an end view of a tenth embodiment of mopping appliance; and FIGS. 35-39 show a partial view of the device of FIG. 18 during sequential stages of operation.

Referring to FIGS. 1 and 2 there is shown a roller type floor mopping appliance comprising roller 2 mounted for rotation about an axle 3 which is fixed in an offset handle 4. The roller 2 is covered by an absorbent mopping pad 1. The mopping roller 2 is arrested by a controllable pawl 5 so that when the appliance is pulled to and fro over the floor surface AA the pad 1 will mop the floor without rolling. The arrangement of the handle 4 shown with the offset end permits the floor to be wiped close up to a skirting or wall.

When the portion of the mopping pad 1 that wipes the floor AA is dirty, a short pull on a handle 6 connected to double pawl 5 by a Bowden cable 7 releases the stepping pawl 5 which then allows the mopping roller 2 to roll a short distance on the floor AA before being re-arrested by the pawl 5. A hitherto unused clean portion of the mopping pad 1 is thus brought into working position. More specifically, actuation of the double pawl 5 allows the mopping roller to roll on the floor through a predetermined angle. The pawl is rotated counterclockwise by the Bowden cable 7, the top pawl descends between two ratchet teeth while the bottom pawl is withdrawn from between the teeth. This allows the roller 2 to advance by a predetermined angle.

When the mopping pad 1 has been indexed through a complete revolution so that its entire circumference has become dirty, the roller mop is washed out in a pail 8 in which a screen 9 has been suspended from hangers 10 and 11, as shown in FIG. 3. For this purpose the operating handle 6 in FIG. 2 is pulled. This first causes the Bowden cable 7 to pull the stepping pawl 5 about fulcrum 197 against a stop 15. Further pulling on cable 7 causes a lever 14 to tilt about a fulcrum 15 in the direction of arrow B. The stepping pawl 5 is thus fully withdrawn from engagement with ratchet teeth 16 on the interior of roller 2 and permits the roller 2 to rotate freely.

The roller mop is now washed out by pulling it to and fro in the direction DD on the screen 9 which for its major part is immersed below the level CC of a cleaning liquid in pail 8, FIG. 3. When the mopping pad 1 is clean the screen 9 is lifted by means of its hanger 12 and re-suspended above the level of the liquid by hanging the hook-shaped configuration 13 over the edge of the pail, FIG. 4. Continuing the rolling and squeezing to and fro motion of the mopping roller in the direction EE squeezes the pad 1 dry. The operating handle 6 is now released. The lever 14, FIG. 2, is caused to pivot about the fulcrum 15 by a spring 17 until it strikes a stop 18 in which position it allows the stepping pawl 5 to re-engage the ratchet teeth 16. The roller mop is again ready for further use.

FIGS. 5 and 6 show a second embodiment of mopping appliance, which is basically similar to the appliance of FIGS. 1 and 2, and has an intermittent mechanism the same as that in the mopping roller illustrated in FIGS. 1 and 2, and is further provided with additional means providing an alternative method of cleaning the pad. The mopping roller appliance in FIGS. 5 and 6 is additionally fitted with a spring-loaded pulley and draw cord device 20 of conventional construction, a protective sheet metal cover 21 and a hingeably low erable foot 22. The mopping roller 2 is fast on a shaft 24 which is journalled in bearings 25.

For cleaning the mopping roller according to FIGS. 5 and 6 the pawl is disengaged, the foot 22 is lowered by swinging it in the direction of the arrow marked F, the mopping roller is immersed in a bucket of water and the draw cord 26 is operated by pulling the handle 27 in the direction marked G. The spring-loaded pulley 20 thus sets the shaft 24 and hence the mopping roller 2 in rotation with the aid of a pawl 28. Pulling the cord 26 by means of its handle 27 several times in succession enables the mopping roller 2 to be accelerated to spin at high speed. The dirt and the liquid absorbed by the roller pad can thus be ejected. The same operation can be repeated in an empty bucket for spin drying the pad. The residual moisture content can be controlled by the degree of acceleration imparted to the mopping pad by pulling the cord 26.

A device for washing out a roller mop according to the invention is illustrated in FIGS. 7 and 8. A trolley 30 carries a bucket 31. The handle 32 of the trolley 30 carries an arm 33 which is hingeably mounted at 34. This arm 33 rotateably carries an idling roller 35, a driving roller 37 and a protective cowl 38. The arm 33 is urged by a spring 39 into the position indicated by the broken outline in FIG. 7. The mopping roller appliance 40 which is to be washed out is introduced into the cowl 38 from the side and then pushed down in direction 1 to deposit it on the idle and driving rollers 35 and 36. Further downward thrust swings the arm 33 into the cleaning liquid in the bucket. This causes the roller arm 33 to operate a contact 41 which starts a motor 36 for spinning the roller 2 by frictional contact with the driving roller 37. The mopping pad 1 enveloping the roller 2 is thus squeezed and spin until it is clean. If the roller mop appliance is slightly lifted in a direction contrary to the arrow I, the spring 39 is free to raise the roller arm 33 out of the cleaning liquid so that the mopping roller 2 can be spin dried. When the roller mop appliance 40 is raised further the roller arm 33 fully rises.
the contact 41 stops the motor 36 and the roller mop appliance 40 can be removed from the device for further use.

The above-described appliances are characterised by the simplicity of their construction. Their principal field of application is in the domestic sphere. An appliance for higher cleaning performance is illustrated in FIGS. 9 to 11.

The embodiment of mopping appliance of FIGS. 9 to 11 comprises a handle 51 having a fork-shaped end 52 which carries a mopping roller 53. A second fork 54 on the handle carries a stepping roller 55. An endless absorbent cloth band 56 is positioned over the mopping roller 52 and the stepping roller 55. The stepping roller 55 contains a torsion spring 57 — constituted in the illustrated embodiment by a twisted rubber band — which is capable of rotating the stepping roller 55 and hence the endless cloth band 56 in the direction marked K when released by a pawl 58. This occurs when the floor mopping appliance is pushed in direction L on the floor AA, since the handle sleeve 59 actuates the pawl 58 through the intermediary of a push rod 60, a lever 61, and a shaft 62. The feed of the endless band 56 in direction K is assisted by the friction between the cloth band and the floor AA.

It will thus be understood that the endless cloth band 56 is advanced a little each time the appliance is pushed forward so that a fresh portion of cloth will be fed under the mopping roller 53 at each forward stroke. However, if desired, the intermittent feeding of the cloth can be suppressed, for instance when parts of the floor are to be cleaned that are not very dirty. In such a case no thrust is applied to the handle sleeve 59 when the appliance is used, the necessary forward thrust being applied exclusively with the other hand gripping the shaft 51 of the handle.

When the entire endless band of cloth 56 has completed one revolution and is therefore dirty all over, it is washed and wrung in a cleaning device such as that shown in FIG. 12.

The cleaning device shown in FIG. 12 comprises a bucket 71 containing a roller assembly 70 comprising three washing rollers 72 and three squeezing rollers 73. The washing and squeezing rollers 72 and 73 may be smooth or fluted rollers or they may have the form of drumshaped screens. The mopping roller 53 of the floor mopping appliance is first placed on the three lower washing rollers 72 which are placed immersely in the washing liquid below the liquid level CC. A lever 63 on the floor mopping appliance, FIGS. 10 and 11, is moved in the direction marked M. This disengages the pawl 58 and allows the stepping roller 55 to revolve freely. Further, a lever 64 is deflected in the direction marked N, disengaging it from ratchet teeth 65. This permits the hook 66 for the twisted rubber band 57 to rotate freely in bearings 67 in the arm 54. Finally, a crank handle 68 is swung out as indicated by P. By turning the handle 68 which is fast with the stepping roller 55, the endless floor cloth 56 in FIG. 12 can be drawn through the washing liquid and washed by squeezing pressure of the washing rollers 72.

When the endless floor cloth band 56 has thus been cleaned the floor mopping appliance is transferred to the upper squeezing rollers 73. Lever 64 in FIG. 10 is now deflected contrary to arrow N, causing the hook 66 to be arrested. By continued turning of the crank handle 68 the endless floor cloth 56 is squeezed between the squeezing rollers 73 and at the same time the torsion spring 57 is wound up. Finally lever 63 is reflected in the direction contrary to arrow M, returning the pawl 58 into engagement with the ratchet teeth of the stepping roller 55, and the crank handle 68 is swung back contrary to arrow P. The floor mopping appliance is then ready for further use.

An alternative arrangement of a washing and wringing device is illustrated in FIG. 13. Rotatably mounted on the forked ends 52 of the appliance between two levers 80 is a washing and squeezing roller 81. By lowering a hoop 82 in the direction Q a cam edge 83 is made to press the washing and squeezing roller 81 against the endless floor cloth band 56 and the mopping roller 53. The incidental purpose of the hoop 82 in this position is to support the appliance from the bottom of the bucket 84. Otherwise the floor mopping appliance is handled for the washing and squeezing operation in the same way as described with reference to FIG. 12 except that for squeezing the cloth dry the appliance must be transferred into an empty pail or bucket.

FIG. 14 shows a cross-section of the endless floor cloth band 56 comprising a backing 74 formed with guide ridges 75 which prevent the endless band from running off the mopping roller 53, and an absorbent facing 76.

FIG. 14 also illustrates an alternative mounting for the mopping roller 53 which is here not mounted on a stub axle at each end as in FIGS. 9 to 11 but runs in two intermediate bearings so that no parts project beyond the end face 78 of the roller so that the floor can be mopped close up to the walls without any component of the appliance being in the way. The gaps which are thus necessarily formed between the components 53 of the roller are utilized for guiding the ridges 75.

The cleaning performance of the described mopping appliance fitted with an endless floor cloth band is limited by the available length of the cloth band — about 1 metre — which cannot even be doubled by disposing the band in two loops as shown in FIG. 16.

A floor mopping appliance fitted with a backwinding cloth band, which can accommodate much greater lengths of cloth band, is illustrated in FIG. 17.

When the appliance of FIG. 17 is ready for use, the cloth band 110 is wound up on a take-off spool 111. From this spool it is taken over an intermittent feed roller 112, a mopping roller 113, a guide roller 114 to a take-up roller 115 which contains a wound torsion spring drive, as described in FIG. 9 to 11 with reference to the stepping roller 55. A pawl 116 is actuable by the appliance control handle 117, likewise as described with reference to FIGS. 9 to 11. In the course of the to and fro motions of the appliance over the floor the cloth band 110 is drawn stepwise from the take-off spool 111 in the direction R and wound up on the take-up spool 115 by the action of the driving spring, the stepwise motion being assisted by the friction between the floor cloth and the floor. The purpose of the intervening intermittent feed roller 112 is to release equal lengths of the floor cloth band. Consequently the pawl co-operates with the intermittent feed roller 112 and not with the take-off spool 111. The take-off spool 111 is mounted on a lever 122 fulcrumed at 118. A spring 119 attached to lever 122 pulls the take-off spool 111 against the feed roller 112 and prevents the wound floor cloth 110 from undesirably running off the spool, irrespectively of the diameter of the roll of cloth con-
tained on the spool 111. The feed of the floor cloth 110 is always controlled, not by the pressure of the take-off spool 111 on the feed roller 112, but by the envelopment angle around the feed roller 112.

For cleaning this floor mopping appliance in a cleaning device such as that shown in FIG. 17, the lever 122 is disengaged and arrested, the pawl 116 is likewise disengaged and the take-off spool 111 is rotated, for instance by means of a crank or some other drive means associated therewith until the entire length of cloth 110 has been backwound contrary to the direction R and is returned to the take-off spool 111. The spring-loaded spool 115 is wound up by this process. If the crank is now released or the drive means of the take-off spool is disconnected the entire band of floor cloth will be pulled by the spring back on the take-up spool. As soon as the band of cloth 110 has been thoroughly washed it is wound back by the drive means of the take-off spool 111, the pawl 116 is re-engaged and the lever 122 released so that the take-off spool 111 again bears against the circumference of the intermittent feed roller 112. The floor cleaning appliance is thus ready for renewed use.

The spools of a floor cleaning appliance containing a backwinding floor cloth can be combined in a single magazine which may be contrived in any one of a plurality of ways, one of which is illustrated in FIGS. 18 and 19. A magazine 130 contains the spring-driven take-up spool 115, the take-off spool 111, the intermittent feed roller 132 together with the ratchet wheel 131 which is on the outside of the magazine wall and a guide roller 114. Between the spool-loaded spool 115 and the take-off spool 111 the magazine has an opening through which the shaft handle 133 of the cleaning appliance carrying the mopping roller 113 can be passed in the direction indicated by arrow T, until the magazine makes contact with a retaining plate 134 and snaps into engagement. Whilst this is being done the mopping roller 113 withdraws an appropriate length of floor cloth 110 from the spring-loaded spool 115 which is thus partly wound up. The shaft 133 includes a bend so contrived that the magazine will click into engagement in an angular position which ensures that the working face of the cloth at surface U is flat and permits the mopping appliance to be pushed underneath furniture and radiators when held at an appropriate working angle.

The band of floor cloth is fed in the same way as already described with reference to FIG. 17. However, in the present instance the floor cloth is prevented from undesirably running off the loosely mounted take-off spool 111 by a spring 135.

For operating the pawl 116 the arrangement in the present embodiment differs from the embodiment in FIGS. 9 to 11 and 17. The pawl 116 is mounted on the retaining plate 134 and connected to the actuating handle 136 by Bowden gear 137. The inner cable 138 of the Bowden gear is attached at one end to the actuating handle 136 and at the other end to the stepping pawl 116. A spring 139 pulls the cable 138 in the direction W, turning the pawl in the direction X and overcoming the resistance of the weaker spring 140.

When thrust is applied to the handle 136 contrary to direction W as the appliance is bodily pushed forward for mopping, the pull of spring 139 is negated and spring 140 is therefore able to deflect the pawl 116 contrary to direction X. As a result, the previously blocking tooth of pawl 116 will disengage from ratchet wheel 131, enabling transport roller 132, which is fixed to the wheel 131, to advance under the pulling action of moving band 110. At the same time, pawl 116, which pivots against direction X, will have its other tooth positioned in front of the next tooth of the ratchet wheel 131, and rotation will be blocked again after a certain angle. If the thrust at handle 136 begins to drop, pawl 116 will swing back to the starting position shown in FIG. 18 in direction X, releasing the blocked tooth of the ratched wheel 131, which advances slightly until stopped by the formerly blocking tooth of pawl 116. As a result, the ratchet wheel advances by an angle which corresponds to the spacing between adjacent teeth thereof. Mopping band 110 has advanced by a corresponding distance, and will then be blocked again. A further short length of cloth is thus withdrawn from the take-off spool by the feed roller. Operation of the system may be more fully understood by reference to FIGS. 35–39. These figures sequentially depict the operation of this device during a mopping cycle.

Yet another arrangement of a magazine for band-shaped floor cloths is comprised in the appliance illustrated in FIGS. 20 to 22. In this embodiment, the magazine 150 contains the spring-driven take-up spool 115, the take-off spool 111, an intermittent feed roller 112 and a ratchet wheel 131. The shaft 151 of the handle is offset to one side and carries a pawl 116 and the associated actuating mechanism. The bottom end of the shaft can be raised about a hinge at 152 as indicated by an arrow Y. When the shaft end is thus raised the magazine is placed over the mopping roller 113, as denoted by arrow Z in FIG. 22, located against the abutments 153 and 154 and clipped into position. By then lowering the bottom end of the shaft 151 into its extended position contrary to direction Y the floor cloth 110 is withdrawn from the magazine and advanced into position for use as illustrated in FIGS. 20 and 21. The shaft 151 is held in the extended position by a catch 155.

If desired the washing and squeezing operation of a floor mopping appliance using an endless band-shaped cloth as in FIGS. 9 to 11 can be fully mechanised in the following way by using the cleaning machine illustrated in FIG. 23, and comprising a tank 90 containing three washing and squeezing rollers 91 and 92. The floor mopping appliance is introduced into the cleaning machine from above so that the mopping roller 53 and the floor cloth band 56 are positioned between the washing and squeezing rollers 91 and 92. At the same time an intermittent feed wheel 93 which is connected to the feed roller 55 and which here replaces the crank 68 in FIGS. 9 to 11 comes to rest on a supporting roller 94 and a drive roller 95.

A cover 96 of the cleaning machine is now closed, locating the mopping appliance in position. A hand lever 97 permits the contact pressure exerted by the washing and squeezing rollers 91 to be adjusted. This enables a desired degree of dampness of the floor cloth band 56 after having been washed and squeezed to be selected, for instance for wiping the floor with a wet cloth or for mopping it with a damp cloth.

When the machine is switched on the following programmed operations take place. The admission of water is initiated by a magnetic valve 100. Solenoids 98 and 99 deflect levers 63 and 64 and thus release the intermittent feed roller 55. A motor 101 is then started. By means of the driving wheel 95 rotation is imparted
to the feed wheel 93. This results in the floor cloth band 56 being squeezed and centrifugally cleaned. During this operation the upper water level is monitored by a pressure detector 102 and the lower level by a detector 103 to keep the water level constant and continuously to renew the water by the operation of a magnetic valve 100 and a pump 104.

The programmer then switches off the magnetic valve 100 and the pressure detectors 102, 103 and causes the pump 104 to empty the tank. The continuously revolving floor cloth band 56 is now squeezed out. The actuating solenoid 99 is de-energised and a revolution counter 105 switched on. Lever 64 arrests the hook 66 and the continued revolution of the feed roller 55 winds up the spring 57 of the spring drive of the feed roller 55. When the necessary number of revolutions has been completed the counter 105 trips the motor 101 and the solenoid 98, permitting the pawl 58 to re-engage. The floor mopping appliance can now be removed from the cleaning machine and put to fresh use.

A floor mopping appliance equipped with a backwinding cloth band as shown for example in FIG. 17 can be washed out in the cleaning machine in substantially the same way as a mopping appliance fitted with an endless cloth, except for the following modifications: The lever 122 of the appliance, FIG. 17, is lifted in the direction S and is so held in the cleaning machine. The drive for backwinding acts on the drive wheel 120 which is fast with the take-off spool 111. The drive in this machine must be reversible. A cloth monitor 121, FIG. 17, is therefore provided for reversing the direction of rotation of the motor driving the cleaning machine, according to the amount of cloth on the spring driven spool 115. The floor cloth band 110 is pulled contrary to direction R by the motor, whereas the spring of the spool 115 pulls it back in direction R.

In order to guard against mould or decay appearing in the wound roll of cloth during prolonged periods of non-use, a disinfectant may be added to the cleaning water prior to the cloth being squeezed for the last time. If this is not sufficient, the cleaning machine may be provided with drying equipment, for instance for supplying hot air which dries the cloth as it travels.

The cleaning of the cloth band in a floor mopping appliance provided with magazines as in FIGS. 18 to 22 is effected in the same way as described for a mopping appliance equipped with a backwinding cloth. For this purpose the magazines are associated with a drive wheel 93, as shown in FIGS. 19 and 22. This may be fast on the shaft of the take-off spool but is outside the magazine.

The dimensions of the cleaning machine can be substantially reduced if it is arranged exclusively to wash and clean the magazines after these have been removed from the mopping appliance. The magazine can then be mounted in the cleaning machine and the floor cloth withdrawn from the magazine by a washing and squeezing roller 160 in the direction indicated by an arrow in FIGS. 24 or 25 and pressed against the washing and squeezing roller 161. Otherwise cleaning proceeds in the same way as already described for a floor mopping appliance fitted with a backwinding cloth. The roller 160 may be supported in any conventional manner, or even by hand.

The employment of an automatic cleaning machine will principally be useful in public baths, toilets, hospi-
tals and large catering establishments. Conveniently at least two floor mopping appliances would be in service so that one can be used whilst the other is being washed and squeezed. Idle time in connection with recleaning the floor cloth can thus be avoided.

The different kinds of floor mopping appliances comprising a mopping roller, an endless band or a backwinding cloth with or without a magazine can be combined with different kinds of cleaning equipment. Moreover, the several features illustrated in conjunction with different embodiments of mopping appliances, such as the control of the intermittent feed by a push-in handle, push rod or Bowden gear, or by applying pull to a Bowden cable, can be optionally used in the illustrated floor mopping appliances.

FIGS. 26 to 34 illustrate other embodiments of mopping appliance according to the invention in association with cleaning equipment operable by a twist spindle.

The mopping appliance as shown in FIGS. 26 and 27 comprises a mopping roller 170 covered by an absorbent mopping pad 171. The mopping roller 170 contains two inner peripheral grooves 172 with sloping sides and two sets of teeth 173 which have the same cross-sectional profile as the grooves 172. The mopping roller 170 runs on an axle 174 bearing two sets of external teeth 175 having the same tooth profile as the teeth 173 and the grooves 172 in the mopping roller 170. The axle 174 is integral with an axle arm 176 which is attached to the shaft 177 of a handle of conventional kind.

The internal diameter of the mopping roller 170 slightly exceeds the external diameter of the teeth 175 on the axle 174 and the mopping roller 170 can be easily mounted on the axle 174 by pushing it axially until it strikes the axle arm 176 at A. If the mopping appliance is loaded in the direction of arrow B the teeth 175 will engage the teeth 173.

When the mopping appliance is pushed to and fro, as indicated by the arrows F and G, FIGS. 27 and 29, then the mopping roller 170 will be locked by engagement of the teeth 173 with the teeth 175 by the load acting in direction B. At the same time the mopping roller 170 is prevented by the interengaging teeth from slipping off the axle 174 in either of the two directions H and L. Should the appliance in the course of mopping the floor laterally strike an obstruction at M, then this bump will be absorbed by the axle arm 176, whereas the mopping roller 170 will be retained by the axle arm 176 when the roller experiences a bump from H.

If it is desired to replace the dirty portion of pad 171 in use by a hitherto unused clean portion the appliance is lifted in a circular motion in direction K at the end of a mopping stroke proceeding in direction G, as shown in FIG. 29. This causes the teeth 173 of the mopping roller 170 to roll upwards on the teeth 175 of the axle 174. In view of the difference in the number of teeth between the two sets 173 and 175 the mopping roller 170 will rotate on the rigid axle 174 through a specific angle, but when lowered to the floor it will again lock for the next mopping stroke in the direction F. In other words, the mopping roller can be indexed in the course of an ordinary working cycle without causing an interruption or significant delay.

For cleaning the mopping roller 170, the long handle of the roller mopping appliance is slightly lifted and displaced sideways in direction M until the teeth 175 on
the axle 174 engage the bottom part of the grooves 172 in the mopping roller 170, as will be understood from FIG. 28. The mopping roller is now free to rotate and can be washed and dried by squeezing and centrifugation as described for example with reference to FIGS. 3 and 4 or FIGS. 7 and 8 above.

For changing the mopping roller 170 the roller mopping appliance is held as shown in FIG. 30 so that the axle 174 points vertically downwards. The mopping roller 170 will then be pushed by the sloping flanks of the teeth 175 into a central position with respect to the axle 174 and it will then drop off. If now the roller mopping appliance is turned over so that the axle 174 points vertically upwards, as in FIG. 31 a fresh mopping roller 170 can be mounted without any trouble.

The particular advantage of the described roller mopping appliance comprising gear teeth for controlling the intermittent feed movement, as illustrated in FIGS. 26 to 29, is its extremely simple design. There are only two components and no fastening elements whatsoever. All the necessary functions during the reciprocating mopping motions can be controlled and effected merely by suitably manipulating the shaft of the handle.

FIG. 32 illustrates a further embodiment of a roller mopping appliance which is a development of the previous embodiment of FIGS. 26 to 28 and is of similar construction with the addition of a hinge 180 which permits the axle arm 176 to be swung in the direction N through an angle of 90° and arrested in this position so that the mopping roller 170 is deflected into a position in which its axis is vertical. If in this position the roller mopping appliance is placed into a pail 187 filled with water, then the mopping roller 170, being buoyant, will rise and thus detach itself from the gear teeth 175. The smooth part of the bore in the mopping roller 170 is centralised by the effect of the crests of the teeth 175 on the axle 174 and can thus be freely rotated.

The locating sleeve 182 of a twist spindle spinning device 181 can be inserted into the hollow axle 174. The twist spindle spinning device 181 in construction and operation resembles an ordinary Archimedean drill excepting that instead of a drill socket it is fitted with a helically geared bevel wheel 183 to which rotation can be imparted in direction P by the twist spindle 185 when the driving grip 184 is pressed downwards. The bevel wheel 183 engages the teeth 186 in the mopping roller 170, causes the roller to spin and thereby centrifugally cleans it. The mopping roller is naturally forced below the level Q—Q of the water in the pail.

For spin drying the mopping roller 170 the mopping appliance including the spinning device 181 is transferred into an empty pail. The self-locking helically cut gear teeth of the bevel wheel 183 prevent the mopping roller 170 from dropping out of its lifted central position. By continuous operation of the driving handle 184 the mopping roller 170 is now spin dried. When this operation has been completed the entire roller mopping appliance is bumped down hard on the bottom of the pail in the direction R. This causes the mopping roller 170 to detach itself from its self-locking engagement with the helical teeth of the bevel wheel 183. The twist spindle device 181 can be withdrawn and the axle arm 176 hingeably swung contrary to arrow N into its former position in which it is arrested. The roller mopping appliance is then ready for further use.

A twist spindle spinning device can also be incorporated in the shaft 190 of the handle of the roller mopping appliance as in the embodiment illustrated in FIGS. 33 and 34. When a clamping nut 191 is slackened off a spring 192 can eject the handle shaft 193 upwards in the direction S. Pumping movements applied to the shaft 193 in direction T will then impart rotation to the twist spindle 194, a friction wheel 195 and hence to the mopping roller 170 which, as described with reference to FIG. 32, has previously been hingeably raised into a vertical position. A roller 196 prevents the mopping roller 170 from floating up and rising beyond the surface QQ of the water or from slipping off the friction wheel 195 downwards when the appliance has been stood upright in an empty pail for spin drying the mopping roller.

I claim:

1. A mopping appliance for mopping floors and the like comprising: elongate handle means; mopping roller means mounted at one end of the handle means; absorbent mop means extending around at least part of the periphery of said mopping roller means to be supported whereby such a portion of said mop means is adapted to engage a floor or like working surface backed up by said mopping roller means, whereby when said appliance is drawn backward and forward across the floor said portion of said mop means is drawn backwards and forward in contact with the working surface to mop the working surface; spring drive means operatively coupled to advance said mop means; intermittent means operatively positioned for selectively locking said mop means and holding the mopping roller means against rotation during the mopping operation and advancing said mop means, said intermittent means being comprised of a double pawl engaging a ratchet wheel connected to said mopping roller means; and means operatively coupled for, during working strokes of said appliance, releasing said intermittent means to intermittently advance said mop means by said spring drive means during the mopping operation irrespective of the friction between said mop means and the floor and the pressure of the appliance on the floor, to bring a previously unused portion of said mop means into the position occupied by said first-mentioned portion of said mop means for engagement with the working surface.

2. A mopping appliance according to claim 1, wherein said intermittent means is connected with an actuating handle at the other end of said handle means, said actuating handle being selectively operable automatically for releasing said intermittent means without extra movement or effort by the operator and without interruption of the mopping work, said double pawl, when operated by said actuating handle, limiting said mopping roller means through a preselected angle of rotation, whereby said mop means is moved on through a preselected length, irrespective of length of time or strength of effort of the working stroke.

3. A mopping appliance according to claim 1, wherein said mop means comprises a mopping cloth band of finite length carried on two spools mounted in a cassette attachable to said handle means.

4. A mopping appliance according to claim 3, wherein said magazine comprises a window between said two spools, said window being adapted to permit passage therethrough of said roller means to withdraw a loop of said cloth band from one of said spools, said loop extending around a portion of the periphery of said roller means, and washing and wringing roller means to press said cloth band against at least one washing and wringing roller means in a separate cleaning device when the magazine is removed from the mopping appliance.