April 21, 1959 H. H. MARKER ET AL 2,882,540

CAM OPERATED MOP DEVICE

Filed Nov. 30, 1953 4 Sheets-Sheet 1

FIG 1.

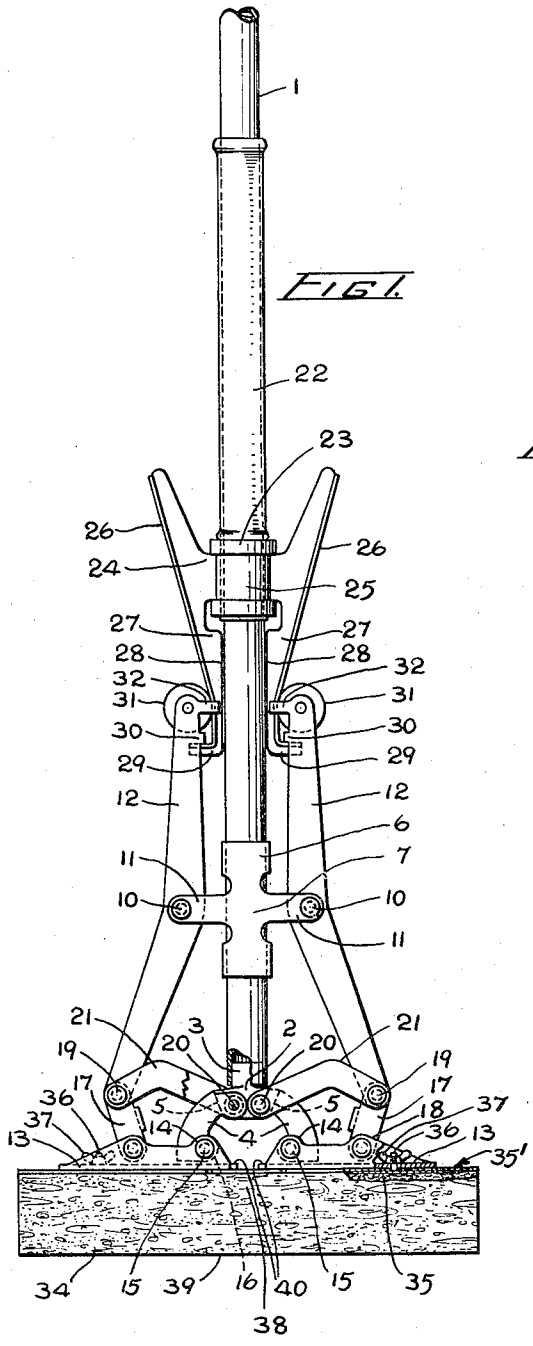
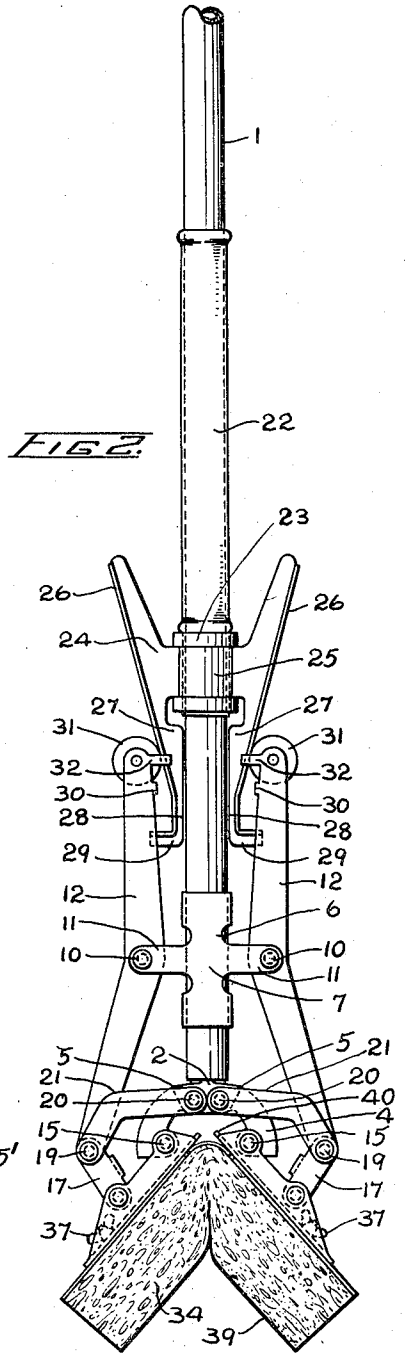


FIG 2.



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FIG 4.

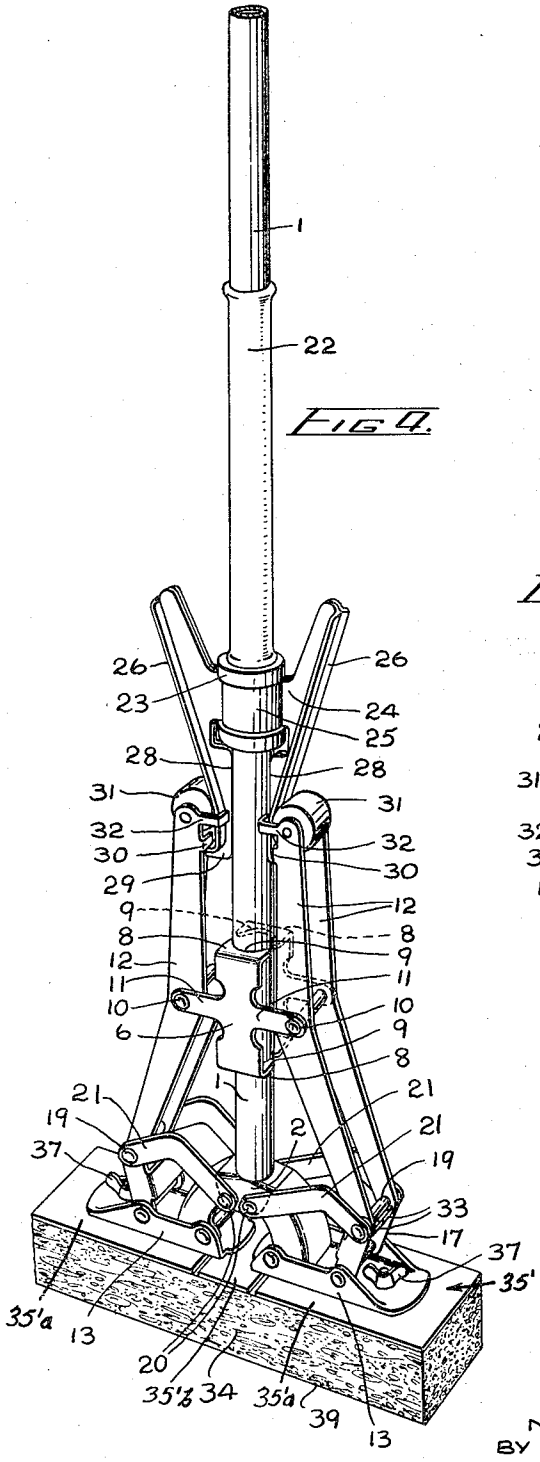
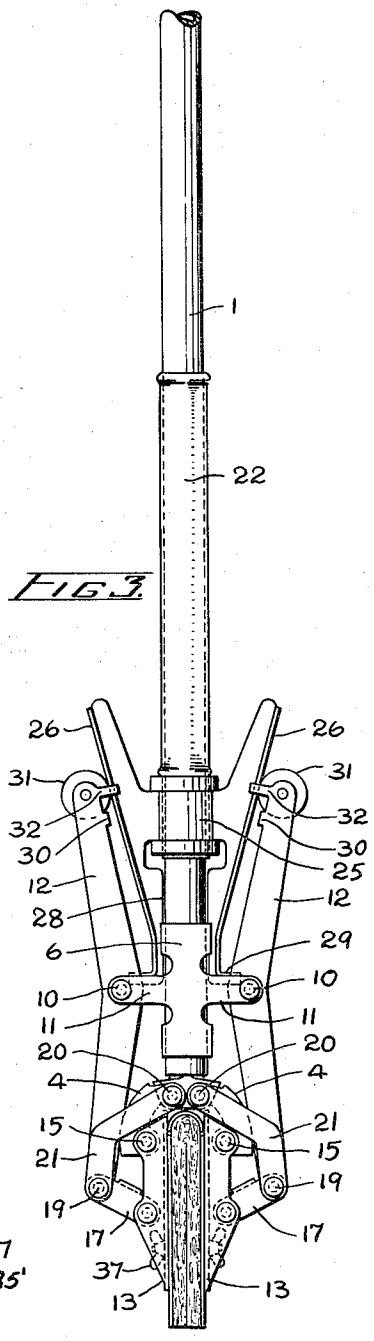


FIG 3.



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CAM OPERATED MOP DEVICE

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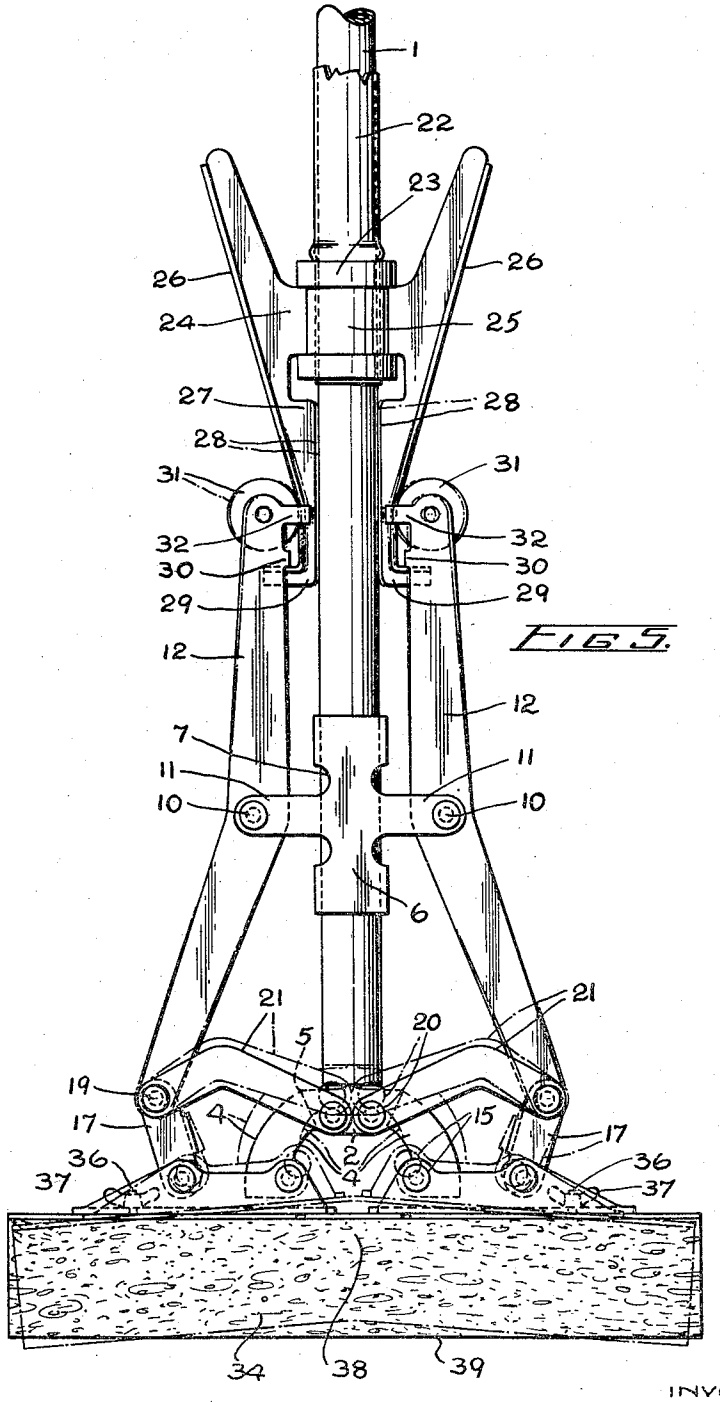


FIG. 3.

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CAM OPERATED MOP DEVICE

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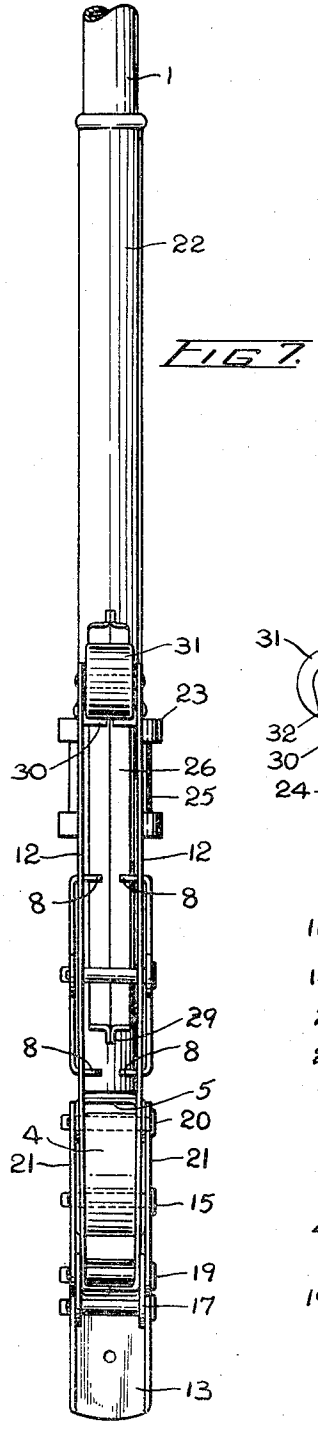


FIG 7.

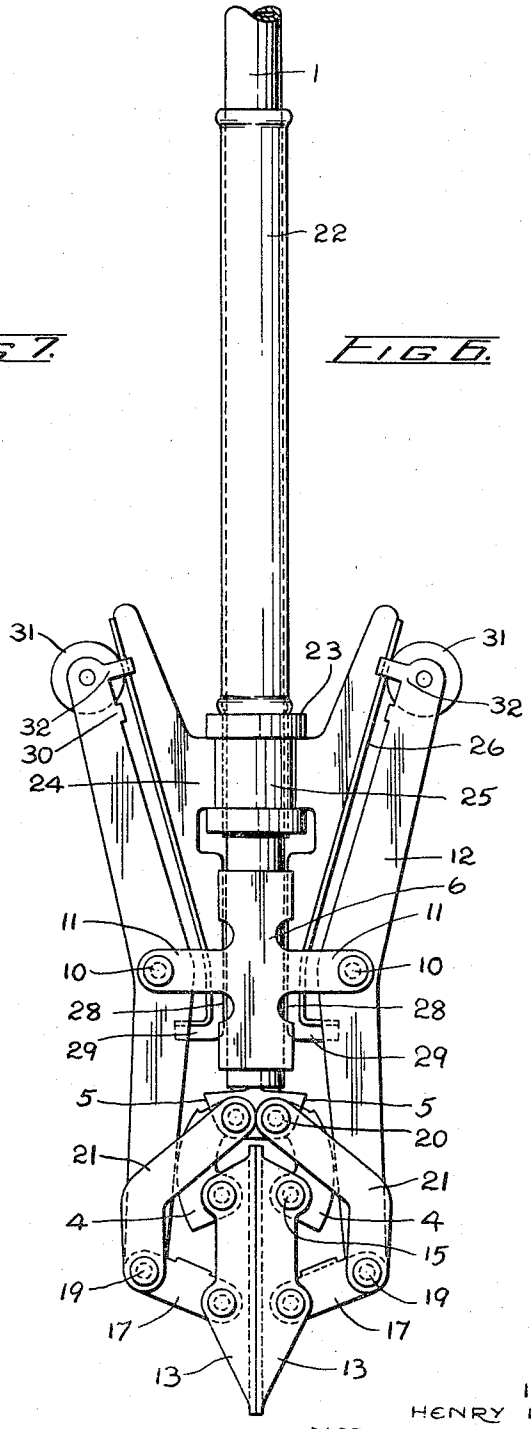


FIG 6.

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United States Patent Office 2,882,540 Patented Apr. 21, 1959

2,882,540

CAM OPERATED MOP DEVICE

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Application November 30, 1953, Serial No. 394,933

12 Claims. (Cl. 15—119)

This invention relates to improvements in mops of the type wherein, in wringing, the mopping element or sponge is folded upon itself and compressed to squeeze out the water therefrom.

The principal object of this invention is to provide a mop of the above type which will enable the sponge to be more thoroughly wrung than heretofore; and to be wrung with considerably less effort and greater efficiency and smoothness of operation.

Another object is to enable the thorough wringing of the sponge to be carried out regardless of the amount of wear on the sponge whereby efficient mop operation can be maintained throughout the life of the sponge and conversely the useful life of the sponge extended.

A further important object is to provide a mop wherein the sponge will be firmly held in its extended mopping position against the folding tendency imparted as it is drawn back and forth across the floor under normal mopping action.

Again it is an object to provide a mop which will operate efficiently with various sizes of sponge.

Still another object is to provide a mop action locating working parts which might be adversely affected by hot water and detergents at positions up out of the water.

Again it is an object to provide a mop as aforesaid of sturdy and reliable construction.

One important feature of the invention resides in providing the mop with a pair of sponge carrying plates mounted to swing from an aligned mopping position to a parallel abutting position for wringing to enable a sponge carried by the plates to be completely and thoroughly wrung.

Another important feature resides in operating the sponge carrying plates through a lever arrangement embodying an over-centre action restraining initial movement of the plates from their aligned mopping position.

A further feature resides in operating the lever arrangement by means of a cam device to provide smooth cam operation coupled with an efficient lever action.

Still a further feature resides in locating the engaging cam surfaces up out of the water and free from contamination.

Again another feature resides in the provision of a V-cam sliding on the handle and engaging rollers carried by the levers to provide a smooth, efficient and balanced wringing action.

Still a further feature resides in slidably supporting the levers from the mop handle to move with the cam during initial wringing action and to be thereafter operated by the cam as the sponge resistance to movement of the sponge plates becomes appreciable thereby providing initially a fast closing action of the plates followed by a subsequent slower cam actuated closing action enabling wringing to be easily carried out but providing sufficient opportunity for the water to be freely expressed as folding of the sponge continues and wringing pressure increases to eliminate resistance of trapped water in the sponge.

These and other objects and features will become apparent from the following detailed description taken in conjunction with the accompanying drawings in which,

Figure 1 is an elevational view partially broken away of a mop embodying the invention and showing the mop in its normal mopping position.

Figure 2 is a view similar to Figure 1 but showing the mop operated to partially fold the sponge.

Figure 3 is a front elevational view of the mop with the sponge fully folded and compressed.

Figure 4 is a perspective view of the mop of Figures 1 to 3.

Figure 5 is an enlarged front elevational view illustrating the over-centre snap action resisting initial movement of the mop elements from the mopping towards the wringing positions.

Figure 6 is an enlarged elevational view of the mop in full wringing position with the sponge removed.

Figure 7 is an edge elevational view of the mop of Figure 6.

With reference to the drawings the mop disclosed comprises a handle 1 shown of tubular form having an enlarged lower end 2 comprising a channel member having a boss 3 received within the handle shaft 1 as shown in Figure 1. Pivotally supported on the handle member 2 are a pair of jaws 4 shown of arcuate form which are adapted to swing between an open position shown in Figure 1 and a closed position shown particularly in Figure 3.

Stop surfaces 5 on the handle member 2 limit opening movement of the jaws 4 to the arch-like formation shown in Figure 1. The jaws 4 thus simulate the movement of a clam shell.

Mounted on the handle 1 is a slide 6 comprising a pair of opposed plates 7 having inturned end flanges 8 formed with concaved bearing edges 9 riding on the handle shaft. The plates are held to the shaft by pivot pins or rivets 10 extending between opposing lateral arms 11 of the plates and pivotally supporting a pair of levers 12 disposed on opposite sides of the handle. A pair of flanged sponge carrying plates 13 are formed adjacent their inner ends as shown in Figures 1 and 4 with apertured knuckles 14 or lugs and pins or rivets 15 passing through these knuckles and similar knuckles 16 formed at the free ends of the jaws 4 pivotally connect the plates and jaws.

Links 17 are pivotally connected to the lower ends of the levers 12 and apertured knuckles or lugs 18 arranged intermediate the length of the plates 13. The links 17 and levers 12 thus form a toggle connection and pivotally connected between the pivots 19 connecting the links 17 and levers 12 and the pivots 20 pivotally connecting the jaws 4 and the handle end member 2 are links 21.

The disposition of the links 21 and pivots 19 and 20 is such that in moving from the mopping to the wringing position, Figures 1 to 3, and particularly Figure 5, the pivots 19 swing through a position where they are in alignment with the pivots 20 and having a maximum displacement from the axis of the handle 1 to provide an over-centre snap action hereinafter more particularly described.

Slidably mounted on the handle 1 is a sleeve 22 provided with a spool-shaped lower end 23 which carries a V-cam generally designated at 24 having a central cylindrical body portion 25 encircling the spool portion 23. The V-cam 24 is flanged to form a pair of upwardly diverging cam surfaces or tracks 26 and these tracks which are of T-section extend appreciably below the

spool 23 to form a pair of oppositely disposed cantilever arms having a measure of resiliency. The web portion 27 of the T-tracks 26 tapers towards the lower end of the cam and extends at its inner edge 28, substantially parallel to but spaced from the handle. At the extreme lower end the tracks 26 are provided with out-turned hooks 29 engaging beneath stops 30 provided on the levers 12.

Mounted on the upper ends of the levers 12 are rollers 31 which are adapted to roll on the tracks 26 being held to the trackways by hooks 32 which project therebeneath. The levers 12 are shown as paired levers, although it will be understood, that they may be channel-shaped or of any other suitable construction.

In the particular illustration herein disclosed, the lower ends of each lever pair are inturned as at 33 with these opposed inturned ends forming spacer means to maintain lever separation.

Secured to the plates 13 is a mopping element or sponge 34, preferably having a cellulose sponge body provided with a backing comprising a pair of plates 35 adhered to the sponge 34 and carrying screw-threaded projections 36 which project through suitable openings in the plates 13 and are engaged by wing nuts 37 clamping the sponge to the plates 13. Preferably a fabric 35' is adhered to the sponge over the plates 35, and may be in the form of three separate portions comprising two elongated end portions 35'*a* flanking a narrow central portion 35'*b* as seen in Figure 4.

The backing plates 35 are separated to provide a flexible intermediate sponge element portion 38, allowing the sponge to be folded when the plates 13 are swung from the mopping position of Figure 1 through to the wringing position of Figure 3 and Figure 6.

In operation, the sleeve 22 is operated down the handle 1 or, conversely, the handle 1 is pulled up through the sleeve 22 as shown in Figure 5 to actuate the sponge-carrying plates 13 from their aligned mopping position of Figure 1 to fold the sponge element 34. During this initial movement of the sleeve 22 or, alternatively, of the handle 1 through the sleeve 22, the links 21 maintain the lower ends of the levers 12 spread apart so that the upper ends carrying the rollers 31 are held from advancing up the diverging cam tracks 26 formed on the V-cam 24. As a result initially the levers 12 have the same relative movement with respect to the handle 1 as the sleeve 22 and V-cam 24, all of which move together initially as a unit relative to the handle.

Because the pivots 19 move on a fixed arc relative to the handle 1, and hence pivots 20, from a position above alignment with the pivots 20 to a position below these pivots, the lower ends of the levers 12, as shown particularly in Figure 5, are spread apart to a maximum degree as the pivots 19 and 20 reach alignment, forcing the resilient lower ends of the T-section tracks 26, forming the cantilever arms, together, as shown in dotted line in Figure 5.

As the pivots 19 swing above or below the pivots 20, or, alternatively, the pivots 20 are drawn above or forced below the pivots 19, the lower ends of the levers 12 begin to approach, allowing the resilient tracks 26 to spring outwardly, as shown in solid line in Figure 5.

This action is important as the spring arrangement of the V-cam and the connection of the links 21 with the levers 12 provides an over-centre snap action which initially resists relative movement of the V-cam with its associated levers 12 and the handle 1 to initially resist swinging movement of the sponge-carrying plates 13 and hence folding of the sponge.

This initial resistance to folding of the sponge is provided to maintain the sponge element distended in the position of Figure 1 under normal mopping action as it is drawn back and forth across the surface to be cleaned. Without such initial resistance drawing of the sponge across the surface has the tendency to fold the sponge into V-form, providing a sloppiness in action in which the full effective length of the sponge is not employed.

As the links 21 and levers 12 reach the position shown in dotted line in Figure 5 continued movement of the sleeve 22, and V-cam 24 relative to the handle 1, causes the rollers 31 to ride up on the cam tracks 26, forcing the upper ends of the levers 12 apart.

Since the links 21 constrain movement of the lower ends of the levers 12 substantially to inward movement, after the dotted line position of Figure 5 has been passed, there is relatively little movement of the levers along the handle 1 until, finally, bodily displacement of the levers is terminated, and their entire motion is constituted by fulcruming about their pivots on the lateral arms 11 under action of the V-cam 24 to close the sponge-carrying plates 13.

In the closing action of these plates the sponge 34 is folded transversely on itself and the plates 13, swung initially by the combined longitudinal movement of the V-cam and lever assembly relative to the handle 1 and subsequently by the fulcruming of the levers under action of the V-cam, swing initially relatively rapidly from the aligned position to form an obtuse angle therebetween, then more slowly, as the bodily displacement of the levers along the handle 1 decreases and finally terminates to close to a parallel position under fulcruming of the levers by the V-cam.

This arrangement provides the mechanical advantage of the levers with the smooth operation of the cam action and retards the full closing of the sponge-carrying plates 13 sufficiently to allow the water to be freely expelled before all of the working face 39 of the sponge is in contact with an opposed part, as shown in Figure 3.

By mounting the plates 13 on the jaws 4, which are in turn pivotally supported at the lower end of the handle, the plates 13 can be swung to a fully closed position so that without the sponge they can be moved to abut from end-to-end, as clearly shown in Figure 6.

Thus the folded sponge of Figure 3 can be compressed to any degree desired to ensure that it is thoroughly and completely wrung, and the sponge can be compressed to a very high degree with relatively little effort under the combined cam and lever action.

Moreover, by supporting the sponge-carrying plates 13 to swing to a parallel abutting position, a thorough and complete wringing of any sponge element 34, regardless of its thickness, can be obtained, and the mop can be effectively used with various sizes of sponges, as by provision of this clam or jaw formation, constituted by the jaws 4, the sponges can be effectively wrung and compressed to a great degree.

Thus the mop can be used until the sponge 34 has been worn to any degree and effectively wrung, and conversely, the wringing action enables the useful life of the sponge element 34 to be extended.

It will be noted that the inner ends of the sponge-carrying plates 13 and indicated at 40, with the plates in the aligned mopping position of Figure 1, project within the arch formed by the jaws 4 and under folding action of the sponge in wringing, support the sponge at the intermediate portion 38 to ensure compressive pressure at this point under wringing. The bulk-up of the central portion of the sponge 38 beyond the plate ends 40 is received within the jaws 4, and in no way interferes with the closing action of the jaws and plates 13.

The resolution of the forces acting on the plates 13 under initial movement of the levers and cam relative the handle, that is, down the handle, are such as to provide a force directed inwardly to close the jaws 4, as shown in dotted line in Figure 5, squeezing the sponge longitudinally, while links 21 and 17 maintain their angular relation. Preferably also the levers 12 are provided with a set to resiliently spread at their lower ends, affording a binding action at the pivots 19, resisting relative turning

of the lower ends of the levers, links **21** and **17** to augment this tendency to impart an initial closing of the clam or jaw members **4**.

Movement of the levers **12** beyond their initial movement causes turning of the sponge-carrying plates **13** and relative movement of the links **17** and **21**, and the increasing pressure under bulking of the sponge as the intermediate portion is folded spreads the jaws **4** again to their maximum open position as fixed by the stop surfaces **5**, as shown in Figure 2. This action also provides resistance to initial folding of the sponge in conjunction with the over-centre snap action afforded by the links **21**, levers **12** and resilient cam tracks **26**.

Following wringing, the sleeve **22** and V-cam **24** are withdrawn up the handle **1**, opening the plates **13**, as the lower ends of the levers **12** are spread as the rollers **31**, which are held to the track **26** of the cam by the hooks **32**, move down the trackway **26**.

As the rollers reach the lower end of the V-cam tracks **26** the hooks **29** of the cam engage the stops **30** to withdraw the levers and slide **6** bodily upwardly to fully open the plates **13** and withdraw the links **21** through their over-centre snap-acting position, as shown in Figure 5, and finally moving the sponge-carrying plates **13** to their aligned mopping position.

It will be understood that various details of construction may be made without departing from the scope of the appended claims.

What we claim as our invention is:

1. A mop comprising a handle, a pair of plates swingably supported at the lower end of said handle and being adapted to swing between a substantially aligned mopping position extending transversely of the handle and a substantially abutting wringing position extending longitudinally of said handle, a foldable sponge element carried by said plates, a slide mounted on said handle, levers fulcrumed on said slide at opposite sides of and extending along said handle, link means connecting the lower ends of said levers and said plates, said levers actuating said plates through said link means from mopping to wringing position upon initial movement along said handle and subsequent fulcruming movement, and V-cam means slidably mounted on said handle and disposed between said handle and the upper ends of said levers for effecting sliding and fulcruming actions of said levers.

2. A mop as claimed in claim 1 in which the upper ends of said levers carry rollers and said V-cam means is provided with an upwardly diverging trackway arrangement on which said rollers operate, and means are provided holding said rollers from movement off said trackway.

3. A mop as claimed in claim 1 in which said V-cam means is provided at its lower end with stop means to engage stop means on said levers to draw said levers and slide upwardly upon upward movement of said cam beyond a point bringing said stops into engagement with said stop means for the levers.

4. A mop comprising a handle, a pair of spaced jaws pivotally supported at the lower end of said handle, a pair of plates pivoted to said jaws, a slide mounted on said handle, levers fulcrumed on said slide at opposite sides and extending longitudinally of said handle, link means connecting the aforesaid jaws and said plates to said levers, said levers having a combined sliding and fulcruming action on said slide to close said jaws and move said plates from a substantially aligned mopping position to a substantially abutting parallel wringing position, a foldable sponge element secured to said plates, and means for actuating said levers, said slide comprising a pair of plates arranged on opposite sides of said handle and having inturned end flanges having concaved edges bearing on said handle, said latter plates being connected by pins forming the fulcra for said levers.

5. A mop comprising a handle, a clam device comprising a pair of spaced pivotal jaws supported at the lower end of said handle to open and close, a pair of plates each pivoted adjacent to their inner ends to one of said pair of pivotal jaws respectively and swingably supported thereby to swing between an aligned mopping position extending transversely of the handle with the inner ends of said plates extending inwardly of said jaws and a substantially abutting parallel wringing position with said inner ends of said plates disposed between said pair of pivotal jaws, a sponge element carried by said plates, a slide mounted on said handle, a pair of levers fulcrumed on said slide at opposite sides of said handle, link means connecting said plates and said clam device to the lower end of said levers to actuate said plates and clam device, means carried by said handle to actuate said levers and move said plates between mopping and wringing positions and close said jaws, said latter means having a divergent camming surface slidable along said handle to selectively limit the movement of said levers.

6. A mop comprising a handle, a pair of clam elements pivotally supported in opposing relation at the lower end of said handle to swing between an open and a substantially closed position, a pair of plates pivoted to said clam elements to swing between an aligned mopping position extending substantially transversely of the handle on opposite sides thereof with said clam elements open and a substantially abutting wringing position with said clam elements closed, a foldable sponge carried by said plates and held thereby in a distended position with said plates in said mopping position and folded on itself and compressed with said plates in said closed position, a slide operating on said handle, a pair of levers fulcrumed on said slide on opposite sides of said handle and above said plates, link means connecting the lower ends of said levers and said plates and forming a toggle, a link means connecting the lower ends of said levers and said handle and means actuating said levers and slide along said handle to produce initial closing of said clam members and plates and subsequently operating said levers about their fulcra to complete the closing action of said clam members and plates.

7. A device as claimed in claim 6 in which said means for actuating said levers and slide comprises a V-cam operating on said handle and having upwardly diverging cam surfaces disposed on opposite sides of said handle between said handle and the upper ends of said levers, rollers carried by the upper ends of said levers and operating on said cam surfaces, and means securing said levers and slide to move with said V-cam as said rollers reach the lower portion of said cam surfaces.

8. A mop comprising a handle, a pair of jaws pivoted at the lower end of said handle and swingable from an open arch defining position and a substantially closed position, a pair of plates pivoted to said jaws, a slide operating on said handle, a pair of levers fulcrumed at opposite sides and extending longitudinally of said handle on said slide, link means pivoted between said jaws and the lower ends of said levers, link means pivotally connected to the lower ends of said levers and to said plates, said levers and links actuating said plates from an aligned mopping position extending transversely on either side of said handle with said jaws being positively moved from said open arch defining position to an opposed closed position, a foldable sponge element secured to said plates, said first-mentioned links having an over-centre action spreading the lower ends of said levers at the point of initial closing of said plates, and means for operating said levers and slide to close said plates and jaws and to resiliently resist spreading of said lower lever ends as said first-mentioned links pass through their over-centre position to resist initial closing of said plates.

9. A mop comprising, a handle, a pair of sponge carrying plates supported at the lower end of said handle to swing between an aligned mopping and an opposed

wringing position, a foldable sponge element carried by said plates, lever means carried by said handle, a link connection between the lower ends of said lever means, handle and plates spacing said lever means from said handle and said plates and providing a connection therebetween, cam means for operating said lever means, and having a resilient formation co-operating with said link connection to resiliently resist initial fulcruming of said levers in initially moving said plates from said mopping position towards said wringing position.

10. A mop comprising a handle, a pair of plates swingably supported at the lower end of said handle and adapted to swing between a substantially aligned mopping position extending transversely of the handle and a substantially abutting wringing position extending longitudinally of said handle, a foldable sponge element carried by said plates, lever means carried by said handle and slidable therealong to move said plates from said mopping position to said wringing position and divergent cam means slidably mounted on said handle for sliding and actuating said lever means.

11. In a mop, a handle, a pair of arcuate jaw elements pivotally supported at the lower end of said handle, a pair of plates swingably supported from said jaw elements and being adapted to swing between a substantially aligned mopping position extending transversely of the handle and a substantially abutting wringing position extending longitudinally of the handle, lever means carried by said handle and being slidable therealong to move said plates from said mopping position to said wringing position and divergent cam means slidably mounted on said handle for sliding and actuating said lever means.

12. In a device according to claim 11 in which said lever means comprises a pair of levers pivoted at opposite sides to a slide slidable along said handle, link means pivotally connected between said jaw elements and the lower ends of said levers, and link means pivotally connected between said plates and the lower ends of said levers, said first mentioned link means having an over-center action spreading the lower ends of said levers to initially resist movement of said plates when moved from the mopping position toward the wringing position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,648,859	Flagstad	Aug. 18, 1953
2,706,303	Ours	Apr. 19, 1955
2,730,744	Vaughn	Jan. 17, 1956

FOREIGN PATENTS

20,332	Great Britain	of 1895
76,184	Norway	Jan. 30, 1950
135,250	Sweden	Apr. 15, 1952
136,719	Great Britain	Dec. 24, 1919
216,565	Germany	Nov. 24, 1909
496,850	Belgium	July 31, 1950
553,287	Great Britain	May 30, 1943
596,139	Germany	Apr. 27, 1934
617,197	Germany	Aug. 14, 1935
1,050,747	France	Sept. 2, 1953