July 1, 1969 J. M. LOMBARDO ET AL 3,452,486

FLOOR SURFACING MACHINE

Filed June 26, 1967 Sheet 1 of 2

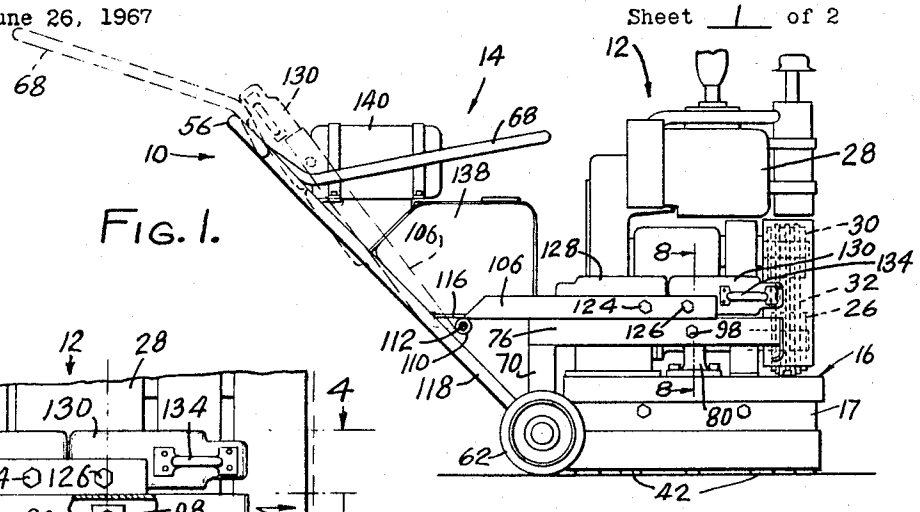


FIG. 1.

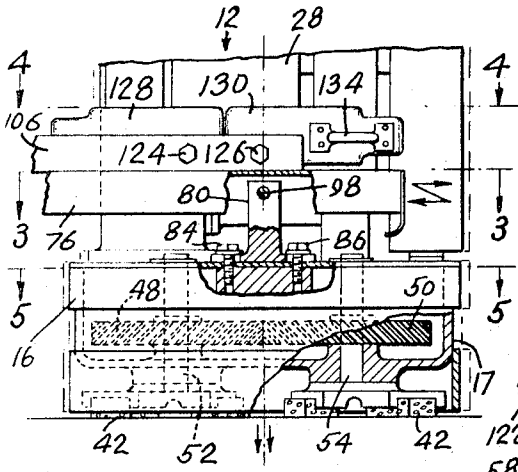


FIG. 2.

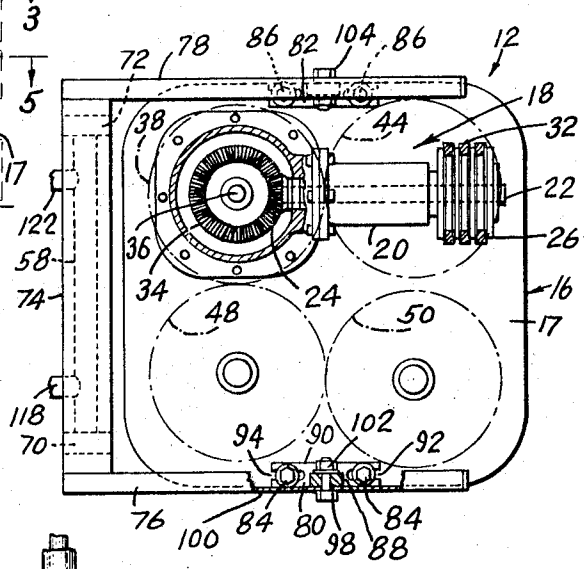


FIG. 3.

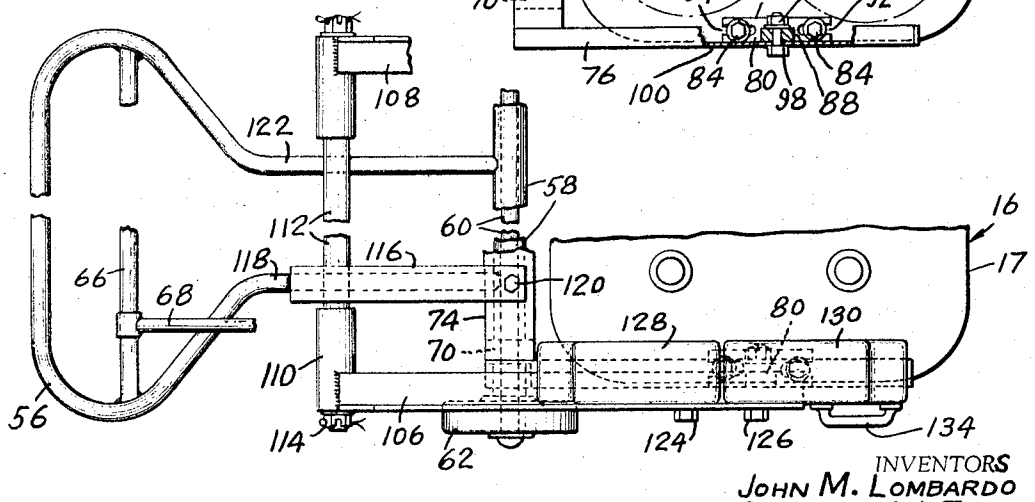


FIG. 4.

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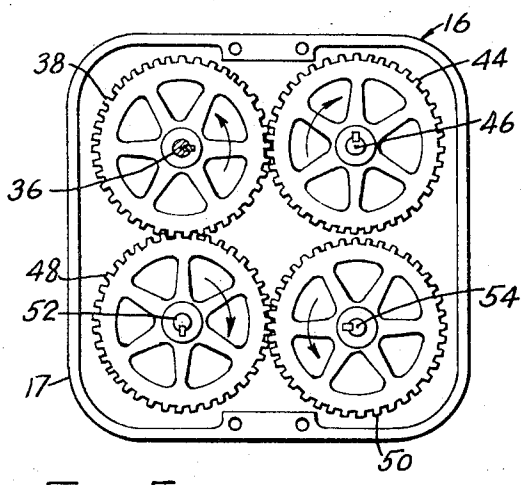


FIG. 5.

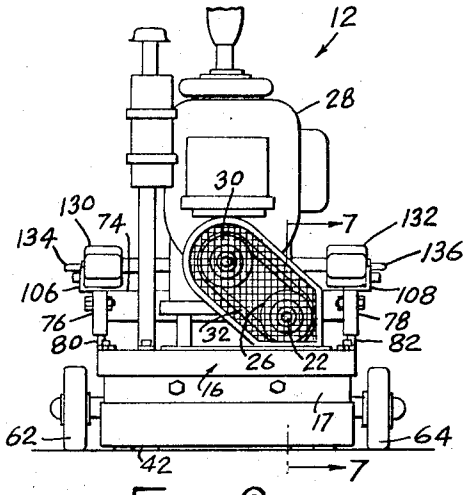


FIG. 6.

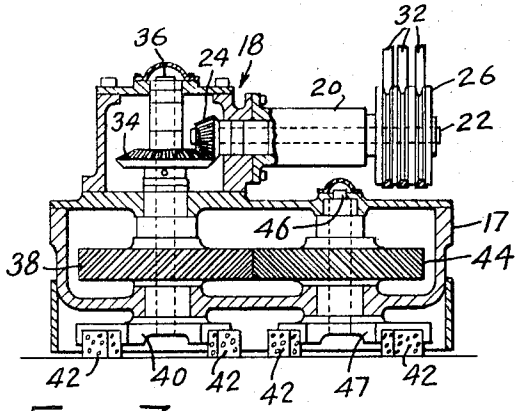


FIG. 7.

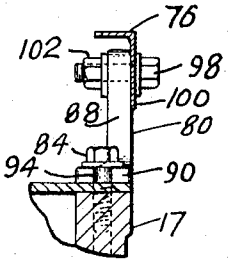


FIG. 8.

FIG. 9.

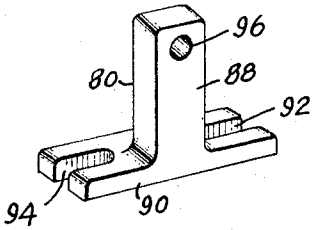
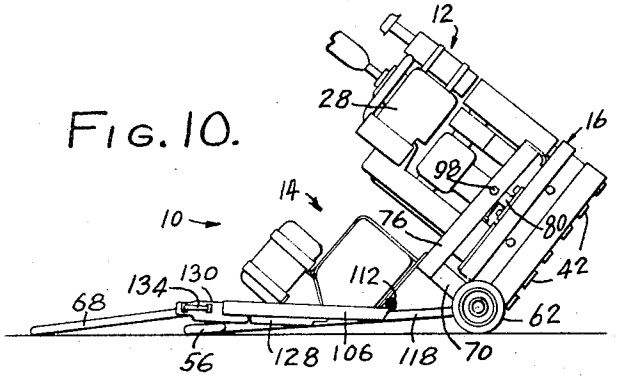


FIG. 10.



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3,452,486

FLOOR SURFACING MACHINE

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Int. Cl. B24b 23/02
U.S. Cl. 51—177 6 Claims

ABSTRACT OF THE DISCLOSURE

A support frame for a pair of fore and aft rubbing discs has mass loading weights selectively and variably disposed by way of bracket fixture between the axes of the shafts of the discs; a horizontally disposed power shaft drives one of the disc shafts through a right-angle drive.

Background of the invention

This invention relates in general to floor surfacing machines and is concerned more particularly with machines of the type used in the finishing of terrazzo tile floors.

In machines of this type, of which the prior art is exemplified in Patent No. 2,793,476, it has been customary to provide a pair of rubbing discs in side by side relationship driven by a vertically disposed electric motor. In such a machine the vertical shafts of the rubbing discs are provided with large driven gears meshing with each other, a small pinion gear on the end of the motor shaft being in engagement with one of the large driven gears.

Evolving from the two-disc machine, in response to production demands for higher rates of surfacing for larger expanses of area, came the four-disc machine with front and rear pairs of discs whose vertical shaft axes intersect approximately the four corners of a square. A natural evolution arrived at a vertical shaft motor, as in prior models, with a pinion on the end of the motor shaft driving a pair of gears disposed on diagonally opposite disc shafts, each of these shafts in turn having a gear meshing with a gear on the adjacent shaft to the front or rear, as the case may be, of an adjacent disc. As can be seen, there is a total of seven gears in the housing to drive the four discs from the vertical motor shaft. This, of course, is an expensive arrangement.

Then, too, the vertical type electric motor required for driving four discs is much larger than for the two-disc arrangement, and disproportionately more expensive. In addition, as power requirements increase, the selection of vertical shaft electric motors from which to choose becomes unduly limited.

Furthermore, it was known that for many cases a power source completely independent of the need for electrical feeder cables would have many advantages and offer the user a wider selection of machines to fit the requirements of the various types and sizes of surfacing jobs to be done. In other words, a gasoline engine as an alternate choice to an electric motor was indicated, but this would call for a complete redesign of basic concepts because of the horizontal output shaft of such an engine.

The present invention was conceived as the aforementioned requirements became evident. It was discovered that only four gears were required in the gear housing, forming a train with each gear on a disc shaft. One of the disc shafts extends vertically upward through the top of the housing and has disposed thereon one of the gears of a readily available and relatively inexpensive right angle drive, the other pinion gear of which is disposed on a horizontal shaft. The other end of the horizontal shaft is provided with a pulley which is coupled to the engine or

electric motor mounted on and spaced above the housing. The arrangement is neat and compact with no parts of the mechanism above the housing extending to any appreciable extent beyond the front and side vertical surfaces of the housing, thus permitting the machine to work close to the walls of the particular area being surfaced. This is extremely important since it minimizes the amount of "hand finishing" required on the floor surfaces adjacent the walls.

One unforeseen problem was presented with the arrangement as aforesaid, and that was the uneven wear of the rubs used in surfacing the terrazzo floors. It was discovered that the location of the center of mass of the whole machine above the rubs was not always concentrated on an exact center between the axes of the rubbing disc shafts, one reason being that the engine or motor was mounted so as to be horizontally adjustable on rails, transversely of the axis of the output shaft, in order to provide takeup of the slack of the V-belts on the pulleys of the output and above-mentioned horizontal shafts. Uneven wear of the rubs is highly undesirable since it contributes to the "down time" of the machine when the rubs have to be replaced.

It was then conceived that auxiliary weights could be applied to the machine and could be adjustably varied as to the point of application of their mass so as to bring about uniform unit loading on the rubs on the discs. In the ultimate evolution of the concept the auxiliary weights are mounted on the ends of swing arms, the other ends of which are pivotally secured to a wheeled handling unit which has pinned connections with the gear housing on either side thereof by way of adjustable bracket fixtures. In one position of the swing arms the mass of the auxiliary weights bear on the bracket fixtures and hence on the rubs. In another position of the arms the weights provide mechanical advantage to enable the entire machine to be rotated or swung on the axis of the wheels to lift the rubs off the floor to enable changing the rubs, all as will be brought forth in detail below.

It is an object of the invention to provide a floor surfacing machine substantially as set forth above and described in detail hereinafter in connection with the drawings wherein a preferred embodiment of the invention is illustrated, and in which:

FIG. 1 is a side elevation view of a floor surfacing machine embodying the invention;

FIG. 2 is a somewhat enlarged view of a portion of FIG. 1 with parts broken away;

FIG. 3 is a top plan view of a portion of the machine taken on the line 3—3 of FIG. 2;

FIG. 4 is a top plan view of a portion of the machine taken on the line 4—4 of FIG. 2;

FIG. 5 is a plan view of the driving gear arrangement taken on the line 5—5 of FIG. 2;

FIG. 6 is a front elevation view of the machine;

FIG. 7 is an elevation view in cross-section taken on the line 7—7 of FIG. 6;

FIG. 8 is a fragmentary view of a portion of the machine taken on the line 8—8 of FIG. 1, and showing one of the bracket fixtures forming a feature of the invention;

FIG. 9 is a perspective view of the bracket fixture of FIG. 8; and

FIG. 10 is a side elevation of the machine of FIG. 1, showing it tilted back onto its handle to a position enabling changing or replacing the rubbing blocks.

Referring to FIG. 1, the floor surfacing machine **10** is shown as comprising two major assemblies, namely the surfacing unit **12** and the handling unit **14**. The surfacing unit **12** comprises a support frame **16** which includes also a housing **17** for a gear train, described in detail hereinafter. Mounted on the frame **16** is a right angle drive **18**, as best seen in FIGS. 3 and 7, the drive **18** including a housing **20** which houses a power transmission shaft **22** on

one end of which is secured the bevel pinion **24**. On the other end of the shaft **22** is disposed the V-belt pulley **26**.

Likewise mounted on the frame **16** is a power means shown as an internal combustion engine **28** having a pulley **30** on the end of its power output shaft. Providing a driving connection between the pulleys **26** and **30** are the V-belts **32**. By this means the power of the engine is transmitted to the bevel pinion **24** which meshes with the bevel gear **34** disposed on the vertical shaft **36**. The shaft **36** extends into and through the housing **17**. Within the housing a gear **38** is secured on the shaft **36**. On the lower end of the shaft **36** is secured the spider or rubbing disc **40** to which is secured in known fashion the abrasive blocks or rubs **42**. Meshing with the gear **38** is a second gear **44** disposed on the second vertical shaft **46** in the housing **17**. On the lower end of the shaft **46** is another spider **47** likewise provided with rubs **42**. It will be observed that gear **44**, shaft **46** and spider **47** (together with its rubs **42**) is disposed to the front of the machine **12**, forwardly of the gear **38**, shaft **36**, and spider **40** (together with its rubs **42**).

Referring to FIG. 5, the gear **38** is engaged by a third gear **48** which, in turn, is engaged by a fourth gear **50**. Gears **48** and **50** are disposed on shafts **52** and **54**, respectively, disposed in the housing **17**. The lower ends of the shafts **52** and **54** are provided with spiders (not shown) similar to that shown at **40** and **47** in FIG. 7. Rubs similar to those shown at **42** are secured in the spiders on the ends of the shafts **52** and **54**. There is thus formed a gear train with the gear **50** driven by the gear **48** which is driven by the gear **38** which also drives the gear **44**. By the nature of things, gear **44** could also be in mesh with the gear **50**. However, it is preferred that there be a slight clearance of the order of ¼ inch between the gears **44** and **50** in order to prevent any lockup of the gear train which might occur by, for example, the loss of a tooth on one of the gears.

Referring back to FIG. 1, the handling unit **14** includes a general U-shaped handle **56**, the lower ends of which are secured as by welding to a tubular member **58** (FIG. 4) which encloses an axle **60**, to the ends of which are secured the carriage wheels **62** and **64**. Transversely disposed across the upper end of the handle **56** is a tubular cross member **66** upon which is swingably received another generally U-shaped auxiliary handle **68** which is normally disposed forwardly as shown in solid lines in FIG. 1 but which may be swung about the transverse member **66** to the dotted line position shown in FIG. 1 in order to provided mechanical advantage to tilt the entire machine **10** about the axis of the wheels **62** and **64** to the position shown in FIG. 10 for the purpose of changing the rubs on the spiders.

The unit **14** further includes a pair of vertical channel iron risers **70** and **72** (FIG. 3) through the lower ends of which passes the axle **60**. A transverse structure member **74** is secured to the upper ends of the risers **70** and **72**, as by welding or any preferred method. The member **74** may be a channel iron or angle iron member, to the ends of which are secured the forwardly disposed angle iron members **76** and **78** by welding at the rearward ends of the latter.

A particular feature of the invention is the means employed to couple the surfacing unit **12** and the handling unit **14** together. To this end there is disposed upon the top surface of the housing **17** a pair of T-shaped bracket fixtures **80** and **82** secured to the housing by bolts **84** and **86**, respectively. The fixtures **80** and **82** are identical, and as best seen in FIGS. 8 and 9 the fixture **80** includes a post **88** upstanding from the foot **90** which is provided with slots **92** and **94** at the front and rear ends thereof.

With this construction it is seen that the fixture **80** is adjustable forwardly or rearwardly of the housing **17** by the simple expedient of loosening the bolts **84**, and likewise for the fixture **82** with respect to the bolts **86**.

The fixture **80** is provided with a bolt hole **96** arranged

to receive a bolt **98** which also passes through a bolt hole in the side flange **100** of the angle iron member **76**, a nut **102** on the bolt **98** securing the members together, as best seen in FIG. 8. A bolt **104** secures the angle iron member **78** and the fixture **82** in similar fashion. It should be noted that when the nuts on the bolts **98** and **104** are drawn up the brackets **80** and **82** are not tightened against the flanged sides of the angle iron members **76** and **78**, respectively. This arrangement permits at least limited swivelling movement of the surfacing unit **12** about the bolts **98** and **104** with respect to the handling unit **14** in order to compensate for wear and attrition of the rubs as the surfacing operation progresses.

A feature of the invention is the mass loading that may be brought to bear selectively on the surfacing unit **12**. To this end there is provided a pair of swing arms **106** and **108** formed preferably from angle iron. As best seen in FIG. 4, the rear end of the arm **106** is provided with a tubular element **110** secured thereto by welding or brazing. The element **110** is disposed over a transverse rod member **112** and swingably secured thereon by a cotter pin or a nut **114**, as preferred, the arm **106** thus being swingable about the axis of the member **112** between the full line and dotted line positions shown in FIG. 1. The member **112** is secured by welding to a strap **116**, one end of which is welded or otherwise secured to the riser **118** of the handle **56** and the other end by a bolt **120** to the transverse structure member **74**. The member **112** is similarly secured to a strap (not shown) disposed between the handle riser **122** and the structure member **74**. The swing arm **108** is swingably disposed on the other end of the transverse member **112** in a fashion similar to that of arm **106**. The arms **106** and **108** are independently swingable about the axis of the rod member **112**.

Secured to the forward end of the arm **106** by means of bolts **124** and **126** are a pair of masses **128** and **130**, respectively. The arm **108** is likewise provided with masses, one of which is shown at **132** in FIG. 6. The masses **130** and **132** are provided with hand grip handles **134** and **136**, respectively, to enable ease of pivotal swing of the arms **106** and **108** about the axis of the transverse rod member **112**.

Either or both of the arms **106** and **108** may be swung back in a counterclockwise direction, as viewed in FIGS. 1 and 10, by means of the handles **134** and **136**, to the dotted line position shown in FIG. 1 whereat they rest against the U-shaped handle **56**. When swung to that position, the load masses assist the operator to tilt the machine to the position shown in FIG. 10. When swung clockwise to rest on the angle iron members **76** and **78**, the weight loading of the masses is brought to bear through the bolts **98** and **104** and the brackets **80** and **82**, respectively, upon the support frame **16** and hence on the abrasive rubs **42**.

As was pointed out above, an important feature of the invention is the provision of means whereby the unit loading, between the rubs **42** and the floor being surfaced, may be adjustably varied so that the attrition of the rubs is substantially uniform. It is now seen from the foregoing description that the adjustability of the bracket fixtures **80** and **82** fore and aft by the loosening of the bolts which secure them to the support frame **16** provides the means aforesaid. Thus, with reference to FIGS. 2 and 3. loosening of the bolts **84** permits fore and aft adjustment of the fixture **80** and likewise for independent adjustment of the fixture **82** by means of the bolts **86**. If, for example, during the operation of the machine it is found that the rubs on the spider or rubbing disc **47** (FIG. 7) are wearing less than those on the disc **40**, the fixture **82** may be adjusted forwardly after loosening the bolts **86**, after which adjustment the bolts are again tightened. It has been found, for example, in a successful working embodiment of the machine that an adjustment of ⅛ inch of a bracket fixture results in a net change of weight of about 20 pounds as between the total load of front and rear rubbing discs on the floor being surfaced.

By this means the wear on the rubs is made uniform, and the rubs on all four discs will last through approximately four hours of concentrated surfacing, hence need be changed only twice during a normal work day.

As a matter of usual practise, there is provided a water tank **138** secured atop straps **116** for the purpose of supplying water through a hose (not shown) to the floor area adjacent the rubs **42**. A gasoline tank **140** is secured to the handle **56** by any convenient means to supply fuel for the engine **28**.

We claim:

1. A floor surfacing machine comprising:

(a) a support frame;

(b) first and second driving shafts vertically and rotatively disposed on said support frame;

(c) first and second rubbing discs with abrasive rubs disposed on the lower ends of said shafts, said rubs adapted to contact a floor to be surfaced;

(d) power means on said support frame and having a driving connection with said driving shafts; and

(e) mass loading means on said support frame substantially intermediate the axes of said shafts for applying mass loading to said discs, said loading means being disposed for adjustability toward and from the axis of one of said shafts to provide adjustable variation of the unit loading on said rubs on said rubbing discs by said mass loading means.

2. The machine of claim **1** in which said loading means comprises a bracket fixture adjustably disposed on said support frame.

3. The machine of claim **2** in which said loading means further comprises a handling unit having a pivotal connection with said fixture, said loading means including a swing arm having one end pivotally connected thereto, said arm being provided with a loading mass adjacent the other end thereof and adapted to bear on said fixture in one position thereof and adapted to bear on said unit in another position thereof.

4. The machine of claim **3** in which said handling unit includes a carriage wheel engaging the floor to be surfaced, said swing arm being pivotally arranged on said unit such that in said other position thereof said loading mass provides mechanical advantage to assist rotation of said machine about the axis of said wheel to lift said rubbing discs from the floor.

5. The machine of claim **1** in which said driving shafts are coupled together for rotation in opposite directions, said driving connection therewith comprising a horizontally disposed power transmission shaft having a gear connection with one of said driving shafts, said power means comprising a horizontal power output shaft having a driving connection with said power transmission shaft.

6. A floor surfacing machine comprising:

(a) a support frame;

(b) first and second driving shafts vertically and rotatively disposed on said support frame;

(c) first and second rubbing discs with abrasive rubs disposed on the lower ends of said first and second driving shafts and adapted to contact a floor to be surfaced;

(d) third and fourth driving shafts vertically and rotatively disposed on said support frame;

(e) third and fourth rubbing discs with abrasive rubs disposed on the lower ends of said third and fourth driving shafts and adapted to contact a floor to be surfaced;

(f) first and second meshing gear means on said first and second driving shafts;

(g) third and fourth meshing gear means on said third and fourth driving shafts, one of said first and second gear means meshing with one of said third and fourth gear means;

(h) power means on said support frame and having a driving connection with one of said driving shafts;

(i) first mass loading means on said support frame substantially intermediate the axes of said first and second driving shafts for applying mass loading on said rubs on said first and second rubbing discs, said first mass loading means being disposed for adjustability toward and from the axis of one of said first and second driving shafts to provide adjustable variation of the unit loading on said rubs on said first and second rubbing discs by said first mass loading means; and

(j) second mass loading means on said support frame substantially intermediate the axes of said third and fourth driving shafts for applying mass loading on said rubs on said third and fourth rubbing discs, said second mass loading means being disposed for adjustability toward and from the axis of one of said third and fourth driving shafts to provide adjustable variation of the unit loading on said rubs on said third and fourth rubbing discs by said second mass loading means.

References Cited

UNITED STATES PATENTS

2,774,199	12/1956	Emmons	51—177
2,793,476	5/1957	Lombardo	51—177
3,128,581	4/1964	Tosetti	51—177

FOREIGN PATENTS

451,149	2/1913	France.

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