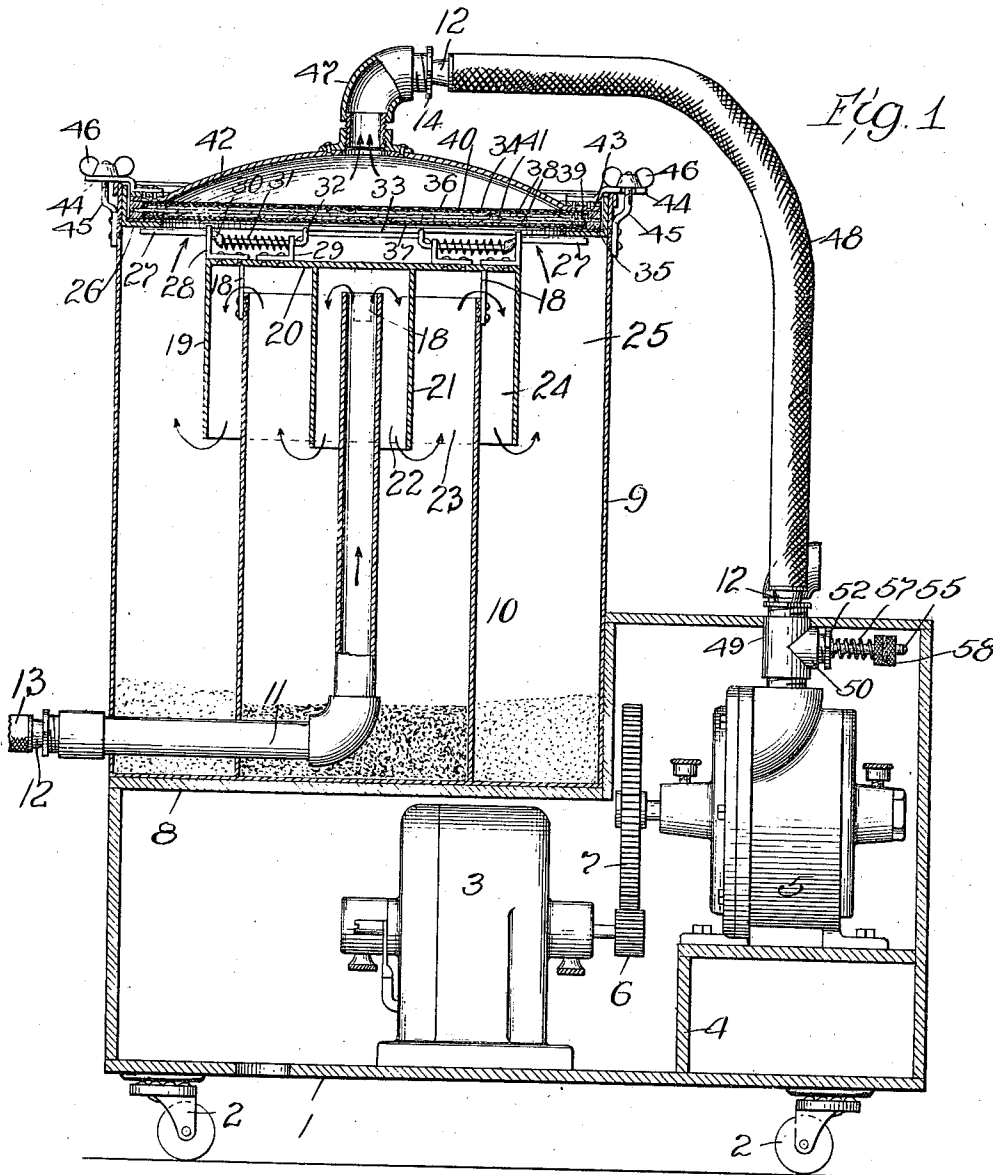


D. D. GRIFFITHS.
PNEUMATIC SUCTION CLEANER.
APPLICATION FILED MAY 17, 1909.

963,139.

Patented July 5, 1910.

2 SHEETS—SHEET 1.



Witnesses:
R. A. White.
H. R. L. White.

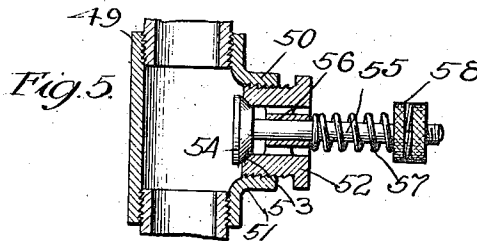
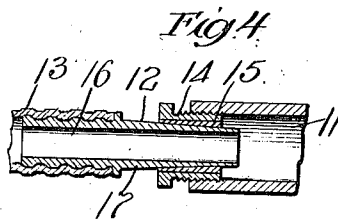
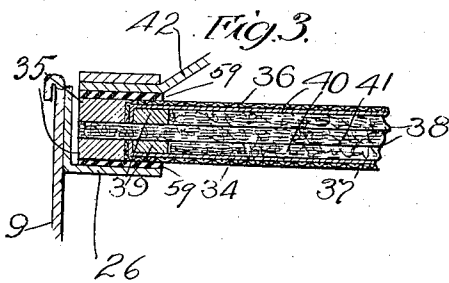
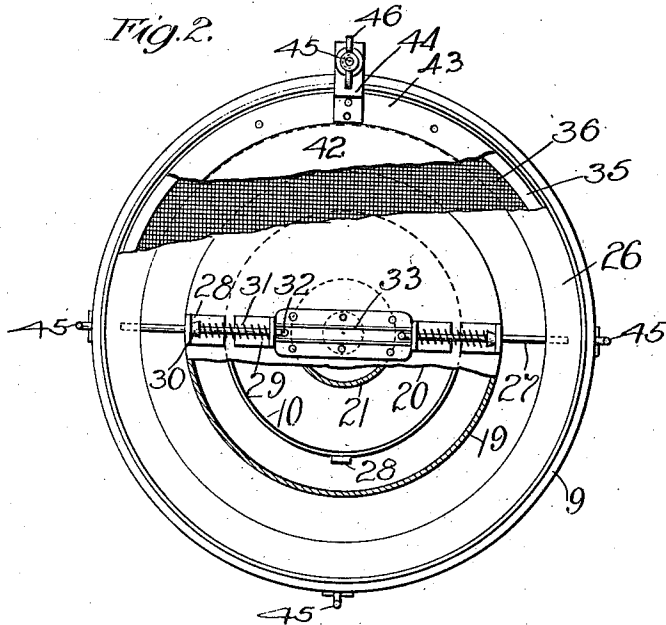
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

DANIEL D. GRIFFITHS, OF NEW MADRID, MISSOURI.

PNEUMATIC SUCTION-CLEANER.

963,139.

Specification of Letters Patent.

Patented July 5, 1910.

Application filed May 17, 1909. Serial No. 496,524.

To all whom it may concern:

Be it known that I, DANIEL D. GRIFFITHS, a citizen of the United States of America, and a resident of New Madrid, county of New Madrid, State of Missouri, have invented certain new and useful Improvements in Pneumatic Suction-Cleaners, of which the following is a specification.

The main objects of this invention are to provide an improved form of pneumatic suction cleaner, which is simple and inexpensive in construction, and which is adapted to efficiently gather the dirt from the surface being cleaned and to separate all of the dust particles from the dust laden air current whether they be lighter or heavier than air; to provide an improved cleaner which is adapted to separate a very large proportion of the dust and dirt from the air current before the current reaches the dust filter and thereby not only add greatly to the efficiency of the device but also greatly reduce the labor required to operate and care for the cleaner; and to provide an improved general arrangement of the main parts of the device as a whole. A specific construction for accomplishing these objects is illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation, partly in section and partly in elevation, of a pneumatic suction cleaner embodying this invention. Fig. 2 is a top plan view of the dust receptacle, partly in section and partly broken. Fig. 3 is an enlarged fragmentary section of the filter. Fig. 4 is an enlarged sectional detail of one of the pipe couplings. Fig. 5 is an enlarged sectional detail of the relief valve for the pump.

In the construction shown, the casing 1 for the operating mechanism, is mounted upon caster wheels 2 to facilitate its being moved about. The casing 1 is made of sheet metal or wood and mounted therein on the bottom of the casing is the electric motor 3. Mounted on a suitable base or foundation 4 in the casing is the rotary air pump 5, which is driven by intermeshing gears 6 and 7 on the motor shaft and pump shaft respectively. The pump base 4 elevates the pump a sufficient distance to bring the large gear 7 on the pump shaft above the smaller gear 6 on the motor shaft so as to reduce the width of the casing to a minimum. An annular seat 8 is provided on the top of the casing and seated in said seat is the dust receptacle 9 which is cylindrical

and is open at its top. The seat 8 prevents the receptacle from falling from the casing but permits it to be readily lifted from the casing when it is desired to remove the dust from the receptacle.

Extending upwardly from the bottom of the receptacle, and in axial alinement therewith, is the annular baffle wall 10, which terminates at its upper end somewhat below the top of the receptacle, and is spaced a considerable distance from the sides of the receptacle.

The receiving pipe 11, which conducts the dirt and dust into the receptacle, extends through one side wall of the receptacle near its bottom, and through one side of the baffle wall 10, and extends upwardly in and concentric with said baffle wall to approximately the same height. Connected in the outer end of the pipe 11, by means of a coupling 12, is the flexible collecting hose 13, which may be provided on its free end with any suitable suction tool, not shown, for gathering the dust and dirt. The coupling 12, as shown more clearly in Fig. 4, comprises a sleeve 14 having threaded engagement in the outer end of the pipe 11, and is provided in its bore with a bushing 15 of any suitable material, and which has an inwardly tapering bore.

Rigidly secured in the adjacent end of the hose 13 is a sleeve 16 which is provided with a conically tapered outer end 17 adapted to extend into the bushing 15 and to be securely held therein by friction.

Arms or posts 18 are secured on the baffle wall 10 and extend a short distance above said wall. Supported on the posts 18 is the inverted, cup shape baffle wall 19 whose annular side walls extend downwardly on the outer side of the baffle wall 10. The baffle wall 19 is concentric with the baffle wall 10 and extends below the top thereof. Extending downwardly from the closed top 20 of the baffle wall 19, and concentric with said wall, is the annular baffle wall 21, which extends into the wall 10 and incloses the upper end of the pipe 11. Said baffle walls 19, 10 and 21 are of such diameters that the downward passage 22, between the pipe 11 and the wall 21 is of less area than the upward passage 23 between the walls 21 and 10, and the downward passage 24 between the walls 10 and 19 is of less area than the passage 23 or the upward passage 25 between the wall 19 and the side of the receptacle 9.

The baffle walls 19 and 21 are spaced above the bottom of the receptacle a sufficient distance to provide large dust collecting pockets which will not soon become filled so as to restrict the passages for air around the lower edges of the walls 19 and 21.

Rigidly secured on the inner side of the receptacle 9 and adjacent to its top is the inwardly directed ledge or flange 26. For the purpose of holding the baffle walls 19 and 21 truly centered with respect to the baffle wall 10 and the receptacle 9, and to hold them firmly on the posts 18, the top 20 is provided on its upper side with oppositely disposed locking bolts 27. Each bolt is slidably mounted in a pair of apertured lugs 28—29 on the top 20 of the baffle wall 19 and normally projects beneath and into close contact with the ledge 26. Each bolt is provided with an offset 30 adjacent to the inner side of the lug 28, which is adapted to engage against the lug and limit the outward movement of the bolt. A coiled spring 31 is carried on each bolt and engages at its ends against the offset and lug 29, respectively, and normally acts to hold the bolt extended beneath the ledge. The inner end of each bolt is turned upwardly to provide a handle 32 by means of which the bolt may be retracted from beneath the ledge. A pair of parallel guides 33 are secured on the upper side of the top 20, one on each side of the bolts. The guides act to hold said handles in upright position.

The disk shaped air filter 34 is supported on the ledge 26 and extends entirely across the receptacle dividing it into upper and lower chambers. The filter comprises upper and lower frame members 35, on the inner side of each of which is secured the inturned margin of a wire screen 36—37. The screen in the upper frame lies in approximately the plane of the upper surface of the frame and that of the lower frame lies in approximately the plane of the lower surface of the frame. Lining the inner side of each screen is a sheet of flannel or other porous fabric 38, and a binding strip 39 of wood or other suitable material is secured to the inner side of each frame member and firmly secures the inturned margins of said screen and flannel between the same and said frame member, as shown more clearly in Fig. 3. Lining the inner face of each sheet of flannel 38 and lying loosely within the binding strips 39 is a layer of thick woolly material 40, and between the layers 40 is a layer 41 of like material whose edges project between the frame members 34—35 on all sides. When the frames are separated, the layers 40 and 41 may be removed without disturbing the wire netting or the sheets of flannel.

A removable cover 42 closes the top of the receptacle. The cover rests at its margins 43

on the filter and is concaved on its under side to raise its central portion out of contact with the screen and provides the upper chamber of the receptacle. The cover is provided on its margin with radially directed arms 44 which project over the sides of the receptacle and are notched at one side to receive the upwardly directed threaded ends of bolts 45 which are secured to the sides of the receptacle. Wing nuts 46 are carried on said bolts and when they are turned downwardly against said arms they act to force the cover downwardly onto the filter. Suitable gaskets 59 are interposed between the cover, filter and ledge to insure tight joints when the cover is held down by the nuts. The cover 42 is provided with a central outlet aperture or port in which is secured a pipe connection 47, and a hose 48 is secured at one end to the connection 47 and at the other end to the inlet 49 of the pump by means of pipe couplings 12.

A relief valve 50 is provided in the inlet 49 and serves to adjust the suction to the surface being cleaned. It prevents the suction from becoming so great as to overload the motor or injure the screen when the screen has become clogged with dirt. The valve comprises a valve casing 51 connected in the inlet 49, and provided in one side with an opening in which is a sleeve 52 having a valve seat 53 on its inner end. A valve closure 54 is adapted to seat on the valve seat and control the passage through the sleeve, and is provided with an outwardly directed valve stem 55 which is supported in a guide collar 56 in the sleeve 52. A coiled spring 57 is carried on the stem 55 and abuts at one end against said collar and at the other end against a nut 58 having threaded engagement on the outer end of the stem. By adjusting said nut on the stem the tension of the spring is varied to adapt the valve closure to open and admit air when the maximum suction desired is reached.

The operation of the construction shown is as follows: The cleaner is wheeled to the vicinity of the surface to be cleaned and the motor is connected with an electric circuit. The operation of the pump causes a suction of air through the hose 48, the receptacle 9 and the collecting hose 13. The air current gathers the dirt and dust from the surface being cleaned and conveys it through the pipe 11 into the baffle wall 21 where it is caused to turn downwardly into the passage 22. When the air is traveling downwardly in the passage 22 it has considerable velocity and the dirt conveyed thereby has gained a considerable momentum. As the air leaves the passage 22 it enters the enlarged area inclosed by the baffle wall 10 and, as it turns upwardly through the passage 23 its velocity has decreased. The decrease of velocity of the air reduces its carrying power, and

the momentum of the heavier particles of dirt causes them to be thrown out of the path of the air current and fall to the bottom of the receptacle. As the air leaves the passage 23 and enters the restricted downward passage 24 its velocity is again increased and the dirt gathers momentum, and when the current enters the enlarged area between the baffle wall 10 and the sides of the receptacle 9 its velocity is again decreased and as the air turns upwardly through the passage 25 all of the dust particles which have gained sufficient momentum to be thrown out of its path are deposited on the bottom of the receptacle. The air then passes through the filter 34 and through the pump to the atmosphere.

By reason of the successive increasing of the velocity of the air current in its downward passages and then suddenly decreasing its velocity at the points where it must turn at sharp angles upwardly, the particles of dust which are heavier than air are compelled by their momentum to leave the path of the air current and pass out of its zone of influence. The successive changes of the velocity of the air current cause all of the dirt and foreign matter which is heavier than air to be deposited on the bottom of the receptacle before the air reaches the filter. As the air passes through the filter all of the finer and lighter dust particles are filtered out.

By reason of the separation of a large portion of the dust and dirt before the air reaches the filter, the filter will not soon become clogged and the efficiency of the cleaner is greatly enhanced.

When it is desired to clean the filter the cover 42 and the screens are first removed. Then, after the baffle walls 19 and 21 are removed by retracting the bolts 27 from beneath the ledge, the dirt may be emptied from the receptacle. Such of the accumulation of dust which cannot be shaken off from the screen may be removed by inverting the screen and passing the suction tool over it after another screen has been placed in the apparatus and the parts reassembled.

While but one specific embodiment of this invention has been herein shown, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention.

I claim:

1. A pneumatic cleaner, comprising a receptacle, a lower baffle wall extending upwardly from the bottom to near the top of the receptacle, a pipe extending through the wall of the receptacle and the baffle wall and upwardly in said baffle wall, a plurality of upper baffle walls arranged concentrically with the lower baffle wall and said pipe and extending a comparatively short distance

below the top of the lower baffle wall, means supporting the upper baffle wall out of contact with the lower baffle wall, an outlet pipe connected in the top of the receptacle, and a filter interposed between said outlet and the baffle walls.

2. A pneumatic cleaner comprising a receptacle having an inlet and an outlet, upwardly directed baffle walls in said receptacle, downwardly directed baffle walls in said receptacle overlapping and alternately arranged with said upwardly directed baffle walls and removably supported thereon, said upwardly and downwardly directed baffle walls being so disposed that the downward passages between them are of less transverse area than the upward passages, and an air filter in the receptacle above said walls and interposed between said passages and said outlet.

3. A pneumatic cleaner, comprising a receptacle, a receiving pipe opening upwardly at the axis of the receptacle, upwardly and downwardly opening tubular baffle walls alternately arranged between said pipe and the walls of the receptacle, said baffle walls being arranged at varying distances apart and adapted to cause an air current from the pipe to travel in the upper portion of the receptacle and toward the walls of the receptacle with alternately increasing and decreasing force, and to leave a zone of comparative quiet in the bottom of the receptacle, an air outlet in the top of the receptacle, and a filter interposed between said outlet and the baffle walls.

4. A pneumatic suction cleaner comprising a receptacle, upper and lower sets of baffle walls in said receptacle, posts on the lower set adapted to support the upper set in position to alternate with the lower set, interlocking means on the upper set of baffle walls and the receptacle adapted to secure the upper set in place, and a pump adapted to draw a dust laden air current through the passage between said walls.

5. A pneumatic suction cleaner comprising a receptacle, an inwardly directed ledge near the top thereof, oppositely disposed upper and lower baffle walls in the receptacle, means on the lower walls adapted to support the upper walls out of contact therewith, locking bolts on the upper walls adapted to engage beneath said ledge and secure said upper walls in place, and an inlet and an outlet for the receptacle.

6. A pneumatic suction cleaner comprising a receptacle, an inwardly directed ledge near the top of the receptacle, oppositely disposed upper and lower baffle walls in the receptacle, means on the lower walls adapted to support the upper walls out of contact with the lower walls, spring pressed locking bolts mounted on the upper walls and adapted to engage beneath said ledge

and secure said upper walls in place, and an inlet and an outlet for said receptacle.

7. A pneumatic suction cleaner comprising a receptacle, an inwardly directed ledge near the top of the receptacle, oppositely disposed upper and lower baffle walls in the receptacle, means on the lower walls adapted to support the upper walls out of contact with the lower walls, spring pressed locking bolts mounted on the upper walls and adapted to engage beneath said ledge and secure said upper walls in place, a filter supported on said ledge, means for securing said filter in place, and an inlet and an outlet for said receptacle.

8. A pneumatic suction cleaner comprising a receptacle, oppositely disposed sets of baffle walls in said receptacle, means supporting one of said sets on the other set and out of contact with the walls of said other set, means removably securing said one set in the receptacle, an inwardly directed ledge extending around the walls of said receptacle above said baffle walls, a filter supported on said ledge, a cover on the receptacle affording a chamber above the filter, and means for clamping said filter between said ledge and the edges of the cover.

9. A pneumatic cleaner comprising a receptacle, an inwardly directed ledge near the top of the receptacle, oppositely disposed and overlapping baffle walls in said receptacle, means detachably supporting one set of baffle walls above and out of contact with the other set, retractable locking bolts on the upper set of walls adapted to engage beneath said ledge and secure said upper set of walls in place, a pair of screens supported on said ledge, a layer of woolly filtering material interposed between said screens, a cover adapted to rest at its edges on said screens and afford a chamber above the screens, means adapted to force the cover into engagement with the screens so as to provide a tight joint between the screens and ledge, an inlet and an outlet pipe for said receptacle.

10. A pneumatic cleaner, comprising a receptacle having an inwardly directed ledge near its top, a filter supported on said ledge, a cover providing a chamber above the filter, means adapted to clamp the cover and filter in place, an outlet pipe connected in said cover, an inlet pipe opening axially of the receptacle and in close proximity to the filter, and means in the receptacle adapted to direct an air current from the inlet pipe alternately downwardly and upwardly in the upper portion of the receptacle and toward the walls of the receptacle before passing through the filter, there being dust pockets in the lower portion of the receptacle and out of the course of the air currents.

11. In a pneumatic cleaner the combina-

tion with a receptacle having an inwardly directed ledge near its top, of an inlet pipe, a lower baffle wall surrounding said pipe, upper baffle walls alternately arranged with said pipe and lower baffle wall and closed at their tops, posts on the lower baffle wall and supporting the upper baffle walls, retractable bars on the upper baffle walls adapted to project beneath said ledge and secure the upper baffle walls in place, a cover supported on said ledge, and an outlet in said cover.

12. A pneumatic cleaner, comprising a receptacle, upper and lower concentrically arranged baffle walls in the receptacle, interlocking means on the upper baffle walls and the receptacle, a filter supported in the receptacle, and affording an air space between the filter and the upper baffle walls, a cover above said filter, and an inlet and outlet in said receptacle and cover respectively.

13. In a pneumatic cleaner, the combination with a dust receptacle, of a filter dividing said receptacle into upper and lower chambers, the upper chamber being provided with an outlet port and the lower one with an inlet port, opposed baffle supports located one above the other in said lower chamber, telescoping baffle members carried by said baffle supports, one of said supports and its baffle members being removable from the receptacle and one end of each baffle member terminating short of the opposed baffle support, a passage connecting the inlet port with the inner one of said baffle members, said baffle members being arranged to form a tortuous passage comprising a series of downwardly disposed passages alternating with upwardly disposed passages, each upwardly disposed passage being of greater transverse area than the preceding downwardly disposed passage, and each downwardly disposed passage being of less transverse area than the next preceding upwardly disposed passage, and dust collecting pockets at the lower ends of said passages.

14. In a pneumatic cleaner, the combination of a dust receptacle and filter extending across the interior of said receptacle and dividing it into two chambers, one of said chambers having an air inlet and the other having an air outlet, for the passage of a dust conveying air current through said receptacle, a system of baffle walls and dust pockets in the first of said chambers adapted to separate dust from the conveying air current, said filter comprising a frame, wire mesh screens secured across opposite faces of said frame, sheets of fabric secured against the inner faces of each of said screens, and a quantity of dust arresting filtering material interposed between said sheets of fabric.

15. In a pneumatic cleaner, the combination of a dust receptacle and filter extending across the interior of said receptacle and

dividing it into two chambers, one of said chambers having an air inlet and the other having an air outlet, for the passage of an air current through said receptacle, a system of baffle walls and dust pockets in the first of said chambers adapted to separate dust from the air current, said filter comprising a main frame including two similar frames each having a wire mesh screen extending across it adjacent to one face and having its other face secured against the corresponding face of the other frame, a mass of dust filtering material interposed between said screens and adapted to be readily removed by the separation of said frames without disturbing the connection of each frame with its respective screen.

16. In a pneumatic cleaner, the combination of a dust receptacle and filter extending across the interior of said receptacle and dividing it into two chambers, one of said

chambers having an air inlet and the other having an air outlet, for the passage of an air current through said receptacle, a system of baffle walls and dust pockets in the first of said chambers adapted to separate dust from the air current, said filter comprising a main frame including two similar sub-frames secured together face to face, a wire mesh screen secured across each of said sub-frames adjacent to its outer face, a sheet of fabric extending across each of said frames adjacent to the screen thereof, and a filling of dust arresting filtering material interposed between said sheets of fabric.

Signed at Chicago this 13th day of May 1909.

DANIEL D. GRIFFITHS.

Witnesses:

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NETTIE M. PIERCE.