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D. J. MURNANE.
MACHINE FOR GRINDING OR POLISHING GLASS.

APPLICATION FILED APR. 5, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

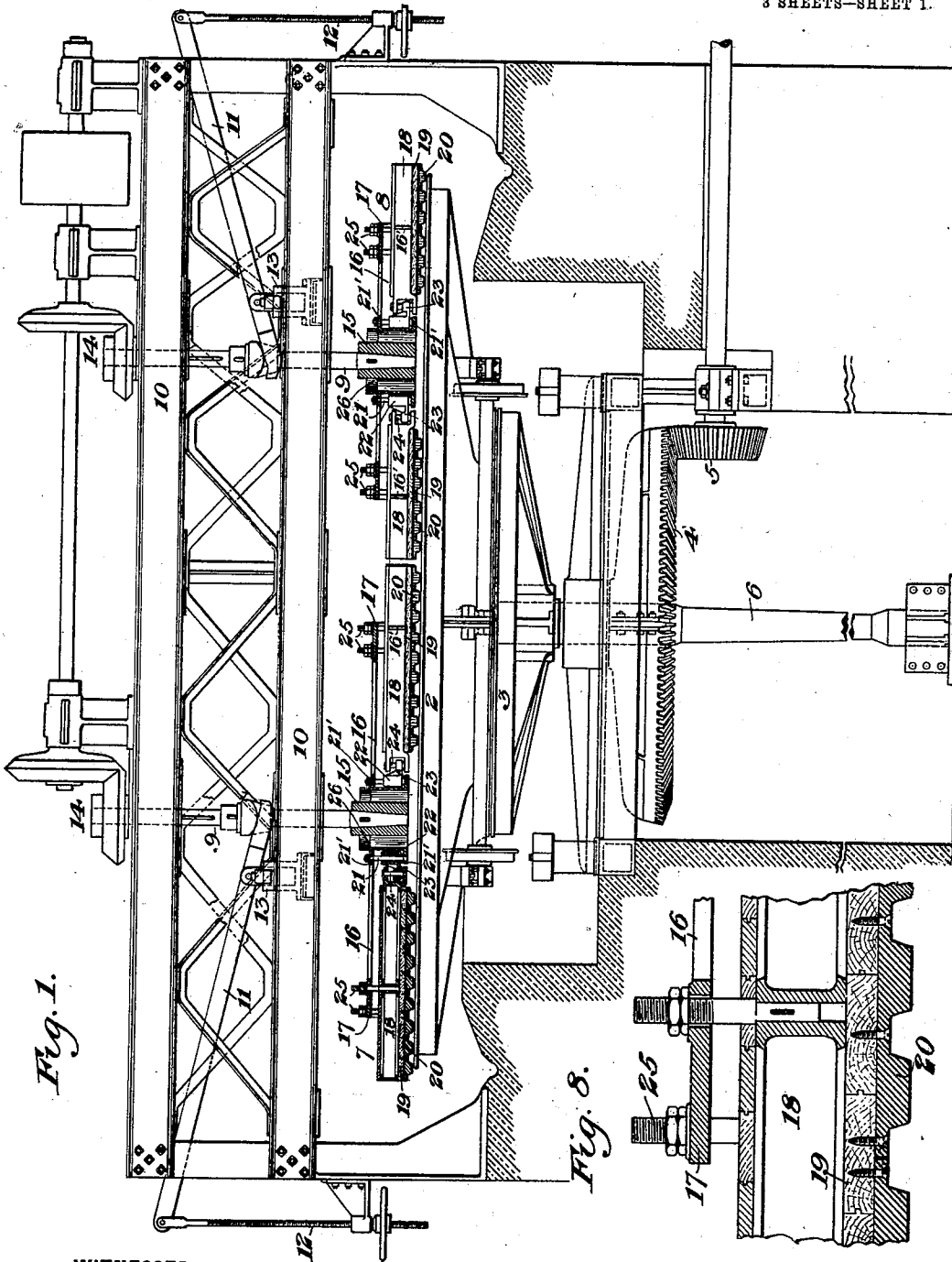


Fig. 1.

Fig. 8.

WITNESSES

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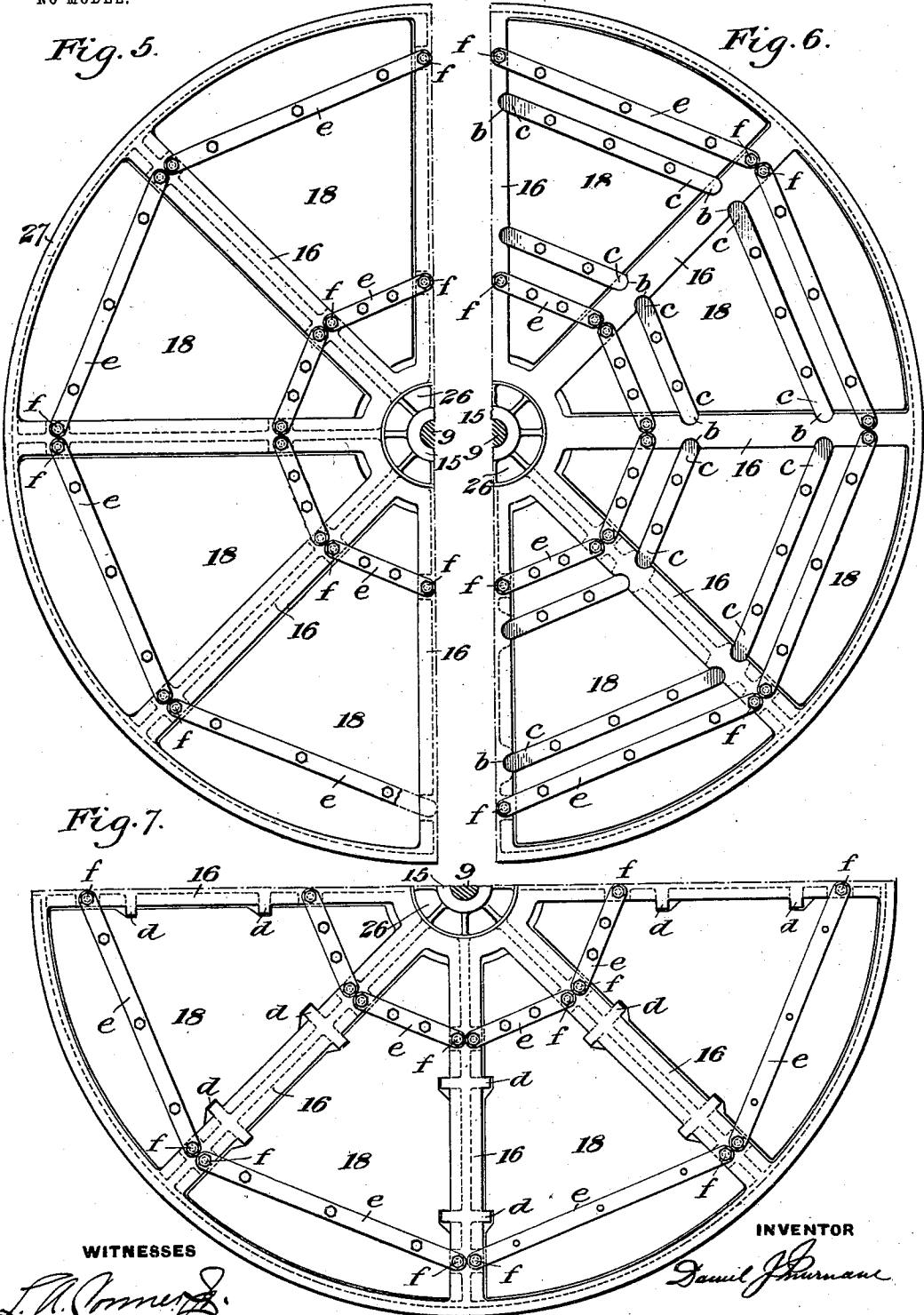


Fig. 5.

Fig. 6.

Fig. 7.

WITNESSES

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MACHINE FOR GRINDING OR POLISHING GLASS.

SPECIFICATION forming part of Letters Patent No. 723,008, dated March 17, 1903.

Application filed April 5, 1902. Serial No. 101,547. (No model.)

To all whom it may concern:

Be it known that I, DANIEL J. MURNANE, of Kirkwood, St. Louis county, Missouri, have invented a new and useful Machine for Grinding or Polishing Glass, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation, partly in section, showing my improved grinding and polishing machine. Fig. 2 is a top plan view of one of the runners, on a larger scale. Fig. 3 is an enlarged detail view of the hub of the runner, showing one means of attaching the block thereto. Fig. 4 is a partial side elevation of the form of runner shown in Fig. 2. Figs. 5, 6, and 7 are plan views showing modifications of the runners and the means of holding the blocks. Fig. 8 is an enlarged detail view showing the manner of adjustably supporting the block.

A large part of the cost of making plate-glass is due to the time required for grinding and polishing the plates. It is the purpose of my invention to provide means by which these operations can be greatly accelerated and the cost and labor thereby lessened. The machine which I have invented for this purpose comprises several features which I believe to be new and which I desire to cover, both separately and in combination with each other.

My machine comprises a table on which the glass is secured and runners carrying grinding or polishing blocks which are adapted to be suspended above the surface of the glass and to be caused to rest upon the same and are provided with mechanism by which they can be rotated at the desired speed, the blocks being gravity-blocks—that is to say, being loosely connected to the runners, so that they can adjust themselves to the surface of the glass, and being preferably carried with the runner in its revolution by lateral contact against the runner-frame.

My machine also comprises grinding or polishing blocks carried by a rotary runner-frame, the connection between the runner-frame and the block being substantially on a level with the body of the block and prefer-

ably at its end portion, so that as the frame is rotated by its gearing the centrifugal action thereof will not cause the block to tip nor bear unequally at certain parts upon the glass, as it would if it were held by a vertically-projecting spindle, but will tend to hold it parallel with the surfaces to be ground or polished.

Another feature of my machine which I prefer to employ consists in arranging the blocks in the runner-frame so that they shall extend tangentially, the purpose being to prevent the entire side of the block from coming into contact at once with projecting edges of the glass on the table and to cause it to come into contact therewith gradually with a diagonal or shear-like motion. Breakage of the glass is thus largely prevented.

Another feature of my machine consists in providing the rotary runner with a gutter or passage near its axis for the introduction of abrasive material, which being fed to the table through said gutter or passage works its way outwardly between the glass and the blocks and is evenly distributed by the centrifugal force of the runner.

Another feature of my machine consists in providing the blocks with a plurality of points of support, preferably three or more. These points of support are arranged so that by their adjustment the lower or grinding surface of the blocks can be adjusted to a uniform plane.

Another feature of my machine consists in using a glass-supporting table which is arranged to be moved at a relatively low rate of speed, in combination with runners carrying gravity-blocks and arranged to be rotated at a higher rate of peripheral speed than the table. By rotating the runners at a considerable speed—for example, at a peripheral speed of three thousand five hundred feet per minute—while the table is run at a much lower rate of speed I am enabled to secure a rapid grinding and polishing action without causing the displacement of the glass or interfering with the uniform distribution of the abrasive.

Other features of my invention are indi-

cated in the claims, and although I show in the drawings a machine embodying all the features of invention above described persons skilled in the art will be able to employ some of said features without the others or to employ them in combination with other parts or mechanism.

Referring now to the drawings, 2 represents the glass-supporting table, mounted removably on a rotary frame 3, which is rotated by gear-wheels 4 5 or otherwise on a vertical axis 6.

7 and 8 are the runners, which carry the grinding or polishing blocks. These runners are keyed to vertical shafts 9 9, journaled in the machine-frame 10 in such manner that they can be suspended above or lowered upon the surface of the glass by means of lifting-levers or other devices 11, having adjusting-screws 12 and lifting-cylinders 13. The shafts 9 are driven by suitable gearing 14, so that the runners are rotated at a rate of speed preferably greater than that of the table and preferably at the same peripheral speed. I recommend as suitable a peripheral speed of three thousand five hundred feet per minute. The runners are preferably of unequal diameters. The table may be rotated at a much lower rate of speed—say from two to four revolutions per minute—and this slow rate is desirable, because the projecting edges of the glass are caused thereby to come into contact gradually and slowly with the periphery of the runner, which cuts its way over the edges and mounts them without danger of breakage.

Each runner is preferably formed with a hub 15, which is keyed to the vertical shaft 9 and has a series of outwardly-extending arms 16, which extend tangentially with reference to the hub, as shown in Fig. 2. These arms are provided with a continuous flange 17 for the support of blocks of approximately sector shape, which are confined laterally between the arms 16, and each block is preferably composed of a metal frame 18, to which the grinding-surface is secured, a convenient mode of attachment being a surface of wood 19, bolted to the underside of the frame and receiving the bolts which hold the cast-iron plates 20, constituting the grinding or smoothing surface. Each block 18 is flexibly connected at its inner portion to the runner-frame. This is conveniently effected by a pin 21, passing through flanges 21' above and below, and on this pin is a sleeve 22 and a link 23, which connects it with a pin 24 on the runner-frame. The sleeve 22 permits a vertical motion of the block 18 relatively to the link, and the link connects the block flexibly to the runner, and the connection being on a level with the block and preferably at its inner portion the strong centrifugal force developed by the rotation will tend to keep the block horizontal and will not tip it or cause it to bear unequally on the glass. For the same purpose the link 23 is preferably arranged opposite to the center of grav-

ity of the block—that is to say, in a line extending from the center of gravity of the block at right angles to the axis of rotation of the runner—and the loose motion permitted by the sleeve 22 enables the link 23 to remain opposite such center of gravity as the grinding-surface is worn.

For the purpose of raising the blocks 18 from the glass when the runner is lifted I provide each block with three or more points of support from the flange 17. These consist, preferably, of three bolts 25, having adjustable nuts or upper ends and extending from the blocks 18 loosely through the flange 17. As these bolts pass loosely through the flange, each block can bear by gravity on the surface of the glass and can be so adjusted by the three bolts that the working surfaces of all the blocks shall be uniform with each other and in exactly the same horizontal plane. The blocks are confined between the arms 16 of the runner-frame and are therefore carried with it in its rotation, and for the purpose of relieving the parts from friction I prefer to make the lateral contact with said arms by projections 16' near the outer ends of the blocks.

In or on the hub 15 is an annular gutter 26, which is intersected by the arms 16 and affords a central passage for the feeding of sand or other abrasive material to the table. The abrasive may be supplied from a suitable hopper and falling through the gutter 26 upon the table will be distributed outwardly and uniformly thereon between the glass and the working surface of the blocks.

In operation of the machine the glass to be ground or smoothed is placed upon the table and is held thereon by plaster-of-paris or any other suitable means. The table is brought under the runners, the runners lowered thereon, and the table and runners are rotated, or, if desired, the table may be constructed so as to have a reciprocating movement. When the runners are lowered into contact with the surface of the glass, the blocks will be freed from the supporting action of the bolts 25 and will rest by gravity upon the glass. The runner-frame itself does not come into contact with the glass. The runners may be driven rapidly without causing any block to press unequally upon the glass or to bind in its bearings, the blocks themselves being carried between the arms 16 of the runner-frames.

The machine enables me to grind and smooth sheets of glass with great rapidity and without any danger of breaking or injuring the glass, the flexibility and perfect adjustment of the blocks being maintained under all conditions.

Instead of the grinding and smoothing blocks shown in the drawings I may apply polishing-buffers to the blocks when a polishing action is desired.

In Fig. 5 I show a modification of my invention in which the gravity-blocks are held at their outer ends against outward centrifugal motion by a strong peripheral flange 27

on the runner. In this case the connection at the inner ends of the blocks may be dispensed with, and when the runner is rotated the blocks will bear laterally against the arms 16 and outwardly against the flange 27 and will be held thereby. The blocks being thus held in line with their centers of gravity are kept in the required horizontal position.

Another modification is shown in Fig. 6 in which the gravity-blocks are set in the runner-frame between arms 16, preferably formed with notches or sockets *b* at their upper edges, into which arms *c*, projecting from the blocks, fit. These arms hold the blocks from endwise movement, and although I do not regard this construction as desirable as the one first above described it embodies some of the principles of my invention.

Another modification is shown in Fig. 7 in which the gravity-blocks are held by lugs *d* on the sides of the arms 16, fitting in vertical sockets on the sides of the blocks, or the lugs may be on the blocks and the sockets on the arms.

In Figs. 5, 6, and 7 I also show a modified construction of adjusting mechanism comprising straps *e*, which project from the blocks and carry adjusting-screws *f*, which bear adjustably upon the arms 16.

The blocks may be of different sizes and shapes, and the spaces in the runner in which they are set will be modified accordingly.

It will be understood by those skilled in the art that the construction of the machine which I have described may be varied in many ways without departing from the principle of my invention, since

What I claim is—

1. A grinding or polishing machine having a moving table for supporting the material to be ground or polished, runners having gravity-blocks, means for maintaining said blocks in substantial parallelism with the surface to be ground or polished when moving at high speed, and driving mechanism adapted to rotate the runners at a higher peripheral speed than the table, substantially as described.

2. A grinding or polishing machine having a runner adapted to be suspended, and means for rotating it, and gravity-blocks held thereby substantially in horizontal line with their centers of gravity whereby under the centrifugal action of the machine the blocks will tend to maintain a position parallel with the surface to be ground or polished; substantially as described.

3. A grinding or polishing machine having a runner adapted to be suspended and having means for rotating it, and gravity-blocks held thereby at the end; substantially as described.

4. A grinding or polishing machine having a runner adapted to be suspended, and means for rotating it, and gravity-blocks held thereby at their inner portions, whereby under the centrifugal action of the machine the blocks will tend to maintain a position parallel with

the surface to be ground or polished; substantially as described.

5. A grinding or polishing machine having a runner adapted to be suspended, means for rotating it, and gravity-blocks carried thereby at points on a level with the bodies of the blocks; substantially as described.

6. A rotary grinding or polishing runner comprising a frame and loose-fitting gravity-blocks which extend from near the center of the runner to the periphery thereof; substantially as described.

7. A rotary grinding or polishing runner comprising a frame and gravity-blocks carried in the frame and making lateral contact therewith, and means for rotating the runner; substantially as described.

8. A rotary grinding or polishing runner comprising a frame and gravity-blocks set between arms on said frame, and means for rotating the runner; substantially as described.

9. A grinding and polishing runner adapted to be suspended and comprising a frame, a gravity-block carried by the frame, and adjusting mechanism arranged to adjust the block vertically in the frame and to support the block at a plurality of points; substantially as described.

10. A grinding or polishing runner adapted to be suspended and rotated, and composed of a frame and gravity-blocks, said frame having spaces formed therein adapted to receive gravity-blocks; substantially as described.

11. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks extending tangentially; substantially as described.

12. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks, said frame having tangential arms which carry the blocks; substantially as described.

13. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks, said frame having tangential arms, and a flange at the top and bottom of said arms near their inner ends, to which the gravity-blocks are connected; substantially as described.

14. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks, said frame having tangential arms with a flange formed around the same from which the gravity-blocks are adjusted and suspended; substantially as described.

15. A grinding or polishing runner adapted to be suspended and having means for rotating it, said runner being composed of a frame and gravity-blocks, the blocks being carried by the frame from a plurality of points when not in contact with the glass; substantially as described.

16. A grinding or polishing runner adapted to be suspended and having means for rotat-

ing it, said runner being composed of a frame and gravity-blocks, the blocks being carried by the frame when not in contact with the glass, and having three or more points of support on the frame; substantially as described.

17. A grinding or polishing runner adapted to be suspended, composed of a frame and gravity-blocks connected to said frame, substantially in horizontal line with the centers of gravity; substantially as described.

18. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks, said blocks being connected to the frame substantially in horizontal line with centers of gravity and held from independent rotation; substantially as described.

19. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks connected to said frame substantially in horizontal line with their centers of gravity by a vertically-movable connection which follows the center of gravity as the grinding-surfaces become worn; substantially as described.

20. A grinding or polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks, said frame having a feeding-space for the abrasive material inside the inner ends of the gravity-blocks; substantially as described.

21. A grinding or polishing runner adapted to be suspended and rotated composed of a frame and gravity-blocks, said blocks being adapted to make lateral contact with the frame at a point outside where said blocks are connected to the frame; substantially as described.

22. A grinding and polishing runner adapted to be suspended and rotated, composed of a frame and oblong gravity-blocks extending from a point near the center of the frame; substantially as described.

23. A grinding and polishing runner adapted to be suspended and rotated, composed of a frame and gravity-blocks, the gravity-blocks being adapted to make lateral contact with the frame when the runner is rotated, and be-

ing also held by the frame from outward centrifugal motion; substantially as described.

24. A grinding or polishing block substantially of sector shape; substantially as described.

25. A grinding or polishing runner having sector-shaped blocks carried in spaces on the runner; substantially as described.

26. A grinding or polishing runner composed of a horizontal rotary frame and blocks, said frame having a feeding-space at its axis for the introduction of abrasive material inside the inner ends of the blocks, substantially as described.

27. A grinding or polishing runner adapted to be suspended and rotated, comprising a frame and gravity-blocks held against centrifugal force from a point of the frame adjacent to its axis of rotation, substantially as described.

28. A grinding or polishing runner adapted to be suspended and rotated, comprising a frame and gravity-blocks suspended from the frame with working surfaces in parallelism with the glass, and held against centrifugal force from a point of the frame independent of the bearings from which the blocks are suspended, substantially as described.

29. A grinding or polishing runner adapted to be suspended and rotated, comprising a frame and gravity-blocks adjustably suspended from the frame, whereby the working surface of the blocks can be maintained in parallelism with the surface to be operated on, substantially as described.

30. A grinding or polishing runner adapted to be suspended and rotated, comprising a frame and gravity-blocks having lateral contact with the frame while the runner is being operated, and having guiding projections affording free vertical movement in the frame, substantially as described.

In testimony whereof I have hereunto set my hand.

DANIEL J. MURNANE.

Witnesses:

THOMAS W. BAKEWELL,
GEO. B. BLEMING.