69th Congress, 2d Session - - - - - - - - - House Document No. 638

U. S. DEPARTMENT OF LABOR
JAMES J. DAVIS, Secretary
BUREAU OF LABOR STATISTICS
ETHELBERT STEWART, Commissioner

BULLETIN OF THE UNITED STATES BUREAU OF LABOR STATISTICS . . . . . No. 436

SAFETY CODE SERIES

SAFETY CODE FOR THE USE CARE, AND PROTECTION OF ABRASIVE WHEELS

INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS AND GRINDING WHEEL MANUFACTURERS ASSOCIATION, SPONSORS

AMERICAN STANDARD
Approved July 7, 1926
American Engineering Standards Committee

MARCH, 1927

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON
1927

ADDITIONAL COPIES

OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
10 CENTS PER COPY

TABLE OF CONTENTS

BULLETIN OF THE

U. S. BUREAU OF LABOR STATISTICS

NO. 436 WASHINGTON MARCH, 1927

SAFETY CODE FOR THE USE, CARE, AND PROTECTION OF ABRASIVE WHEELS

INTRODUCTION

On February 11, 1922, the American Engineering Standards Committee approved as a Tentative American Standard a safety code for the use, care, and protection of abrasive wheels. This code had been drafted under the rules of procedure of the American Engineering Standards Committee. The sponsors were the International Association of Industrial Accident Boards and Commissions and the Grinding Wheel Manufacturers' Association of the United States and Canada.

After its approval many thousand copies of the code were distributed, and it is believed that it was quite generally accepted by consumers, operators, enforcing bodies, insurance companies, and others interested as the most authoritative publication available on this subject.

A few desirable changes in the code were called to the attention of the officers of the sectional committee. At a meeting of this committee held on March 25, 1926, these changes were put into definite form and were then submitted to a letter ballot of the entire sectional committee. The results of this ballot indicated unanimous approval of the changes. These were subsequently approved by both sponsors, who then submitted the revised code to the main committee for approval as an American standard.

This approval was granted July 7, 1926, and the code is now issued as an American standard.

The sectional committee which approved the revised code consists of the following members:

Name and address	Association, society, or firm represented	Sectional committee group
Chairman, L. W. Chaney, U. S. Bureau of Labor Statistics, Washington, D. C.	U. S. Department of Labor	Federal Government.
H. L. Whittemore, U. S. Bureau of Standards, Washington, D. C.	U. S. Bureau of Standards	Do.
Prof. C.-E. A. Winslow, consulting hygienist, 62 Park Street, New Haven, Conn.	U. S. Public Health Service	Do.
H. G. Ehret, director of safety, Industrial Commission of Ohio, Columbus, Ohio.	I. A. I. A. B. C. and Industrial Commission of Ohio.	State regulatory bodies.

Name and address	Association, society, or firm represented	Sectional committee group
R. McA. Keown, engineer, Industrial Commission of Wisconsin, Madison, Wis.	I. A. I. A. B. C. and Industrial Commission of Wisconsin.	State regulatory bodies.
John P. Meade, director division of industrial safety, department of labor and industries, Boston, Mass.	I. A. I. A. B. C. and Department of Labor and Industry of Massachusetts.	Do.
Rowland H. Leveridge, bureau of electrical and mechanical equipment, department of labor, Trenton, N. J.	I. A. I. A. B. C. and Department of Labor of New Jersey.	Do.
Cyril Ainsworth, secretary industrial board, Harrisburg, Pa.	I. A. I. A. B. C. and Department of Labor and Industry of Pennsylvania.	Do.
Secretary, A. Rousseau, Norton Co., Worcester, Mass.	Grinding Wheel Manufacturers' Association and Norton Co.	Manufacturers of apparatus concerned (grinding wheels and grinding machines).
F. R. Henry, A. A. Simonds-Dayton Co., Dayton, Ohio.	Grinding Wheel Manufacturers' Association and A. A. Simonds-Dayton Co.	Do.
George W. Chormann, Carborundum Co., Niagara Falls, N. Y.	Grinding Wheel Manufacturers' Association and Carborundum Co.	Do.
John R. Kempf, Detroit Star Grinding Wheel Co., Detroit, Mich.	Grinding Wheel Manufacturers' Association and Detroit Star Grinding Wheel Co.	Do.
J. B. Baker, Safety Emery Wheel Co., Springfield, Ohio.	Grinding Wheel Manufacturers' Association and Safety Emery Wheel Co.	Do.
J. H. Byers, The Abrasive Co., Philadelphia, Pa.	Grinding Wheel Manufacturers' Association and The Abrasive Co.	Do.
H. W. Dunbar, member, A. S. M. E., Norton Co., Worcester, Mass.	National Machine Tool Builders' Association.	Do.
C. H. Gale, superintendent foundries Pressed Steel Car Co., McKee's Rocks, Pa.	American Foundrymen's Association.	Employers as users of grinding wheels
G. E. Sanford, member, A. I. E. E., A. S. S. E., and A. S. M. E., General Electric Co., Schenectady, N.Y.	National Founders' Association	Do.
Frank P. Brown, Brown & Sharpe Mfg. Co., Providence, R. I.	National Metal Trades Association.	Do.
F. M. Ward, Otis Elevator Co., Yonkers, N. Y.	Otis Elevator Co	Do.
H. J. Weeks, chairman General Standards Commission for State of Ohio, American Steel & Wire Co., Pittsburgh, Pa.	American Steel & Wire Co	Do.
H. D. Herron, International Harvester Co., Chicago, Ill.	International Harvester Co	Do.
S. E. Whiting, member, A. I. E. E., Liberty Mutual Insurance Co., Boston, Mass.	National Association Mutual Casualty Cos. and Liberty Mutual Insurance Co.	Insurance interests
Thomas M. Nial, National Bureau of Casualty and Surety Underwriters, 120 West 42d Street New York, N. Y.	National Bureau of Casualty and Surety Underwriters.	Do.
W. Dean Keefer, National Safety Council, Chicago, Ill.	National Safety Council	General interests.
W. B. Gardiner, 43 Tremont Street, Hartford, Conn.	American Society of Mechanical Engineers.	Engineering and technical bodies.
A. J. Gifford, Leland-Gifford Co., Worcester, Mass.	Society of Automotive Engineers.	Do.
G. E. Sanford, General Electric Co., Schenectady, N. Y.	American Society of Safety Engineers.	Do.
Rowland H. Leveridge, Department of Labor, Trenton, N. J.	American Society of Safety Engineers.	Do.
P. J Conlon, 9th Street and Mt. Vernon Place NW., Washington, D. C.	International Association of Machinists.	Employees as users of equipment.
George J. Speidel, 90 Bayway, Elizabeth, N. J.	Metal Polishers, Buffers, and Platers of North America.	Do.

The membership of the two associations sponsoring this code is as follows:

GRINDING WHEEL MANUFACTURERS OF UNITED STATES AND CANADA

The Abrasive Co., Philadelphia, Pa.
American Emery Wheel Works, Providence, R. I.
Brantford Grinding Wheel Co. (Inc.), Brantford, Ontario, Canada.
Bridgeport Safety Emery Wheel Co., Bridgeport, Conn.
Carborundum Co., Niagara Falls, N. Y.
Chicago Wheel & Manufacturing Co., Chicago, Ill.
Cortland Grinding Wheels Corporation, Chester, Mass.
Detroit-Star Grinding Wheel Co., Detroit, Mich.
Hampden Grinding Wheel Co., Springfield, Mass.
Lion Grinding Wheels (Ltd.), Brockville, Ontario, Canada.
Norton Co., Worcester, Mass.
Norton Co. of Canada (Ltd.), Hamilton, Ontario, Canada.
Pittsburg Grinding Wheel Co., Rochester, Pa.
Precision Grinding Wheel Co., Philadelphia, Pa.
Safety Emery Wheel Co., Springfield, Ohio.
Sterling Grinding Wheel Co., Tiffin, Ohio.
The A. A. Simonds-Dayton Co., Dayton, Ohio.
Vitrified Wheel Co., Westfield, Mass.
Waltham Grinding Wheel Co., Waltham, Mass.
White Heat Products Co., West Chester, Pa.
Wolf's New Process Abrasive Wheel Co., Meriden, Conn.

INTERNATIONAL ASSOCIATION OF INDUSTRIAL ACCIDENT BOARDS AND COMMISSIONS

ACTIVE MEMBERS

United States Employees' Compensation Commission.
United States Bureau of Labor Statistics.
California Industrial Accident Commission.
Connecticut Workmen's Compensation Commission.
Delaware Industrial Accident Board.
Georgia Industrial Commission.
Hawaii Industrial Accident Boards (counties of Kauai, Maui, Hawaii, and Honolulu).
Illinois Industrial Commission.
Iowa Workmen's Compensation Service.
Kansas Court of Industrial Relations.
Maine Industrial Accident Commission.
Maryland State Industrial Accident Commission.
Massachusetts Industrial Accident Board.
Michigan Department of Labor and Industry.
Minnesota Industrial Commission.
Montana Industrial Accident Board.
Nevada Industrial Commission.
New Jersey Department of Labor.
New York State Industrial Commission.
Ohio Industrial Commission.
Oklahoma Industrial Commission.
Oregon State Industrial Accident Commission.
Pennsylvania Department of Labor and Industry.
Utah Industrial Commission.
Virginia Industrial Commission.
Washington Department of Labor and Industries.
West Virginia State Compensation Commissioner.
Wisconsin Industrial Commission.
Wyoming Workmen's Compensation Department.
Department of Labor of Canada.
Alberta Workmen's Compensation Board.
Manitoba Workmen's Compensation Board.
New Brunswick Workmen's Compensation Board.
Nova Scotia Workmen's Compensation Board.
Ontario Workmen's Compensation Board.

ASSOCIATE MEMBERS

Idaho Industrial Accident Board.
North Dakota Workmen's Compensation Board.
Ontario Safety League.
Porto Rico Workmen's Relief Commission.
Republic Iron & Steel Co., Youngstown, Ohio.
Industrial Accident Prevention Association of Toronto.
Nebraska Industrial Commission.

SECTION I. SCOPE AND DEFINITIONS

10. Scope.

This code is intended to give rules and specifications which are necessary to insure safety in the use of abrasive wheels operating at speeds in excess of 2,000 surface feet per minute.

11. Definitions.

Shall and should.—The word "shall" where used is to be understood as mandatory and "should" as advisory.

Abrasive wheel.—The term "abrasive wheel" where used shall be understood to mean power-driven wheels which consist of abrasive particles held together by artificial or natural mineral or organic bonds. Metal, wooden, cloth, or paper wheels or disks having a layer or layers of abrasive on the surface are not included.

Protection hood.—A "protection hood" is an inclosure consisting of a peripheral and two side members, constructed according to specifications which appear later in this code.

Cast hood.—A cast hood shall be defined as a hood which has the peripheral protecting member cast integral with at least one side member, and may be made of gray-iron castings, malleable-iron castings, or steel castings.

Fabricated hood.—A fabricated hood shall be defined as a hood which is built up or constructed by bolting, pinning, riveting, or welding the peripheral protecting member to the side members, and may be made of structural-steel plate, wrought-iron plate, or an assembly of either of these in combination with gray-iron castings, malleable-iron castings, or steel castings or a material possessing an equivalent tensile strength.

Protection flanges.—"Protection flanges" are flanges designed to be used with abrasive wheels of special shape, in such a manner as to effectively retain the parts of a wheel—should such wheel break in operation—in addition to the usual function of clamping the wheel to the spindle.

Protection flanges are of several types, of which the following are the most commonly used:

"Tapered flanges," sometimes called safety, beveled, or concave flanges, which are used with wheels having convex side or sides.

"Hub flanges," which are used with wheels having a raised hub or hubs.

"Ring flanges," having concentric ring or rings projecting from the bearing sides of the flanges, which fit into corresponding grooves in the sides of the wheels.

Protection band.—A "protection band" is a continuous band placed around a cup, cylinder, or sectional ring wheel to effectually retain the pieces of such a wheel which might break in operation.

Protection chuck.—A "protection chuck" is a chuck used for mounting cup, cylinder, or sectional ring wheels, so designated that the jaws inclose the wheel up to the point specified in rule 70.

SECTION II. TYPES OF PROTECTION DEVICES

20. General requirements.

All abrasive wheels shall be provided with one of the following forms of protection, which are listed in the order of preference:

(*a*) Protection hoods.
(*b*) Protection flanges.
(*c*) Protection bands.
(*d*) Protection chucks.

Exception.—This requirement shall not apply to wheels used for internal grinding, nor to wheels 3 inches or less in diameter running at a speed not exceeding 3,000 feet per minute.

Forms (*c*) and (*d*) shall apply to cups, cylinders, and sectional ring wheels; forms (*a*) and (*b*) to all other shapes of wheels. When form (*a*) is used with wheels running faster than 7,000 surface feet per minute the hoods shall be of the fabricated type, with no castings in the side or peripheral members.

SECTION III. HANDLING AND STORAGE

30. Storage.

Extreme care should be exercised in the storage of wheels. They should be stored in dry places and should be supported on edge in racks. Straight-sided shellac and rubber-bonded wheels of ¼ inch or less in thickness shall be laid flat on a straight surface to prevent warpage.

31. Inspection.

Immediately upon receipt, all wheels should be closely inspected to make sure that they have not been injured in transit or otherwise. For added precaution wheels should be tapped gently with a light implement, such as the handle of a screw driver. If they sound cracked, they should not be used. Wheels must be dry and free from sawdust when applying the test.

SECTION IV. GENERAL MACHINE REQUIREMENTS

40. Rigidity, supports.

Grinding machines should be sufficiently heavy and rigid so as to minimize vibration. They should be securely mounted on substantial floors, benches, foundations, or other structures.

27857°—27——2

41. Size of spindle.

No user of wheels shall operate on any machine of given spindle diameter a wheel of larger diameter or greater thickness than specified in the following table:

Diameter, in inches	Thickness of wheel, in inches																	
	¼	⅜	½	⅝	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	4	4½	5
6	½	½	½	½	½	½	⅝	⅝	¾	¾	¾	¾	¾	¾	¾	¾	1	1	1
7	½	½	½	½	⅝	⅝	⅝	¾	¾	¾	¾	¾	¾	1	1	1	1	1	1
8	⅝	⅝	⅝	⅝	⅝	⅝	¾	¾	¾	1	1	1	1	1	1	1	1¼	1¼	1¼
9	⅝	⅝	⅝	⅝	¾	¾	¾	¾	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼
10	¾	¾	¾	¾	¾	¾	¾	¾	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½
12	¾	¾	¾	¾	¾	1	1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1½	1½	1½
14	⅞	⅞	⅞	⅞	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	1½	1½	1½
16					1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	1½	1½	1¾	1¾	1¾	1¾
18					1¼	1¼	1¼	1½	1½	1½	1½	1½	1½	1½	1¾	1¾	1¾	1⅞	1⅞
20						1½	1½	1½	1½	1½	1½	1½	1¾	1¾	1¾	1⅞	1⅞	1⅞	1⅞
24						1½	1½	1½	1¾	1¾	1¾	1¾	1¾	1¾	2	2	2	2	2
26							1½	1½	1¾	1¾	1¾	1¾	2	2	2	2	2¼	2¼	2¼
30								1¾	1¾	2	2	2	2	2	2¼	2¼	2½	2½	2½
36									2	2¼	2¼	2¼	2½	2½	2½	2¾	2¾	3	3

42. Limit stop.

Grinding machines should be provided with a stop or other means of fixing the maximum size of wheel which can be used.

44. Direction of spindle thread.

Ends of spindles shall be so threaded that the nuts on both ends will tend to tighten as the spindles revolve. Care should be taken in setting up machines that the spindles are arranged to revolve in the proper direction, else the nuts on the ends will loosen.

NOTE.—To remove the nuts they should both be turned in the direction that the spindle revolves when the wheel is in operation.

45. Length of spindle thread.

The length of the spindle and the distance from the end which the thread extends shall be such as to allow the entire length of the nut to bear on the thread so as to exert its full pressure on all thicknesses of wheels which may be used.

46. Size of wheel holes.

Wheel holes should be made approximately 0.005 inch large.

SECTION V. PROTECTION HOODS

50. General requirements.

Hoods should be used on every operation where the nature of the work will permit, and shall always be used with wheels which are not provided with protection flanges, chucks, or bands.

51. Mounting and fastenings.

Hoods shall be so mounted as to maintain proper alignment with wheels, and the fastenings shall have ample strength to minimize displacement in case of wheel breakage.

52. Exposure: Bench and floor stands.

The maximum angular exposure of the grinding wheel periphery and sides for hoods used on machines known as bench and floor stands should not exceed 90°, or one-fourth of the periphery. This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See fig. 1.)

Wherever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125°. This exposure shall begin at a point not more than 65° above and extend to a point not more than 60° below the horizontal plane of the wheel spindle. (See fig. 2.)

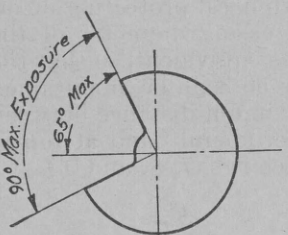

FIG. 1

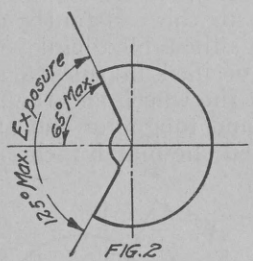

FIG. 2

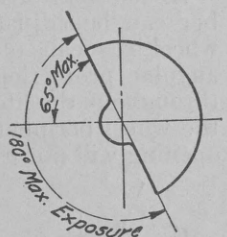

FIG. 3

53. Exposure: Cylindrical grinders.

The maximum angular exposure of the grinding wheel periphery and sides for hoods used on cylindrical grinding machines shall not exceed 180°. This exposure shall begin at a point not more than 65° above the horizontal plane of the wheel spindle. (See fig. 3.)

54. Exposure: Surface grinders.

The maximum angular exposure of the grinding wheel periphery and sides for hoods used on surface grinding machines which employ the wheel periphery shall not exceed 150°. (See fig. 4.)

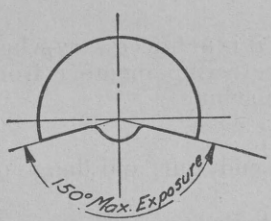

FIG. 4

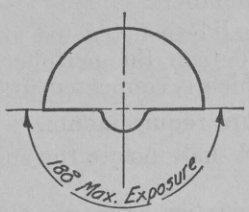

FIG. 5

55. Exposure: Swing frame and portable grinders.

The maximum angular exposure of the grinding wheel periphery and sides for hoods used on machines known as swing frame and portable grinding machines shall not exceed 180°, and the top half of the wheel shall be protected at all times. (See fig. 5.)

56. Exposure: Top grinding.

In operations where the work is ground on the top of the wheel, the exposure of the grinding wheel periphery shall be as small as practicable, with a maximum exposure of 60°. (See fig. 6.)

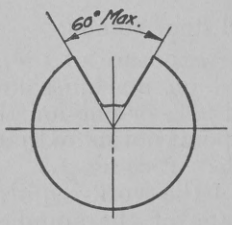

FIG. 6

57. Exposure adjustment.

Hoods shall be constructed so that the peripheral protecting member can be adjusted to the constantly decreasing diameter of the wheel by means of an adjustable tongue, or its equivalent, so that the angular protection specified in rules 52 to 56 will be maintained throughout the life of the wheel, and the maximum distance between the wheel periphery and tongue or end of peripheral band at top of opening will not exceed one-fourth inch. (See figs. 7, 8, and 9.)

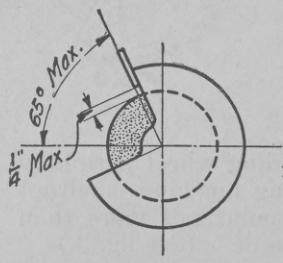

FIG. 7-CORRECT

Showing adjustable tongue giving required angular protection for all sizes of wheels used.

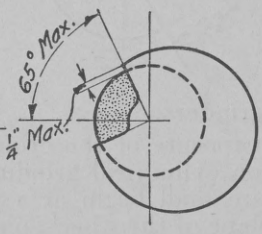

FIG. 8-CORRECT.

Showing movable hood with opening small enough to give required protection for smallest size wheel used

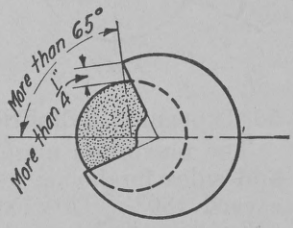

FIG. 9-INCORRECT.

Showing movable hood with size of opening correct for full size wheel, but too large for smaller wheels.

58. Fixed members.

Hoods shall be constructed so that it is not necessary when changing wheels to detach the peripheral protecting member from the side member which is connected to the machine.

59. Enclosure requirements.

The hood shall inclose the spindle end, nut, and flange projections, if any.

NOTE.—Protection hoods on cylindrical grinding machines, in all operations where the work provides a suitable measure of protection to the operator, may be so constructed that the spindle end, nut, and flanges are exposed; and where the nature of the work is such as to entirely cover the side of the wheel, the side covers of the guard may be omitted.

500. Minimum dimensions for the peripheral and side members.

The cast members specified in this table may be used with wheels running up to 7,000 surface feet per minute.

Fabricated hoods as specified, or other types of construction offering equal protection and having no castings in the side or peripheral members, shall be used with wheels running between 7,000 and 10,000 surface feet per minute.

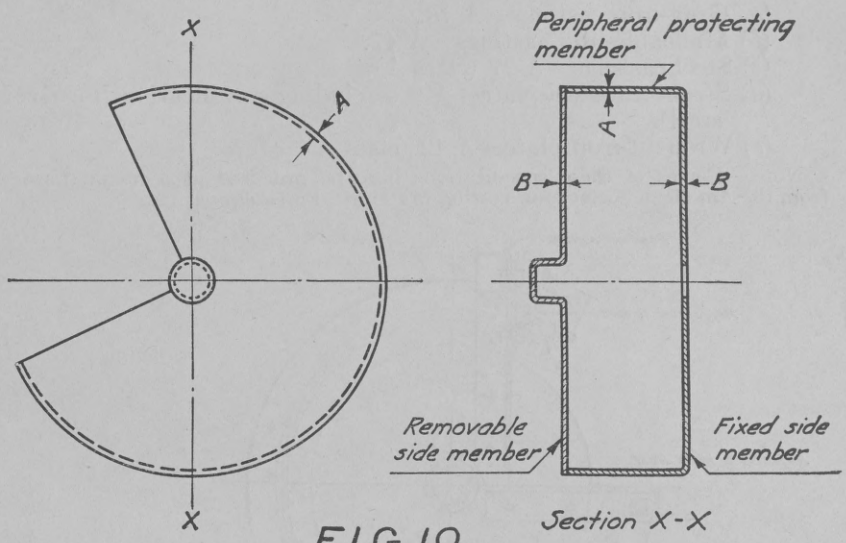

FIG. 10

Material used in construction guard	Maximum thickness of grinding wheel	Grinding wheel groups by diameters													
		3 to 6 inches		7 to 12 inches		13 to 16 inches		17 to 20 inches		21 to 24 inches		25 to 30 inches		31 to 48 inches	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
Cast members satisfactory for speeds up to 7,000 SFPM															
Cast iron	2″	1/4	1/4	3/8	5/16	1/2	3/8	5/8	1/2	7/8	5/8	1	3/4	1 1/4	1
	4″	5/16	5/16	3/8	5/16	1/2	3/8	3/4	5/8	1	5/8	1 1/8	3/4	1 3/8	1
	6″	3/8	5/16	1/2	7/16	5/8	1/2	1	5/8	1 1/8	3/4	1 1/4	7/8	1 1/2	1 1/8
Malleable iron	2″	1/4	1/4	3/8	5/16	1/2	3/8	5/8	1/2	3/4	5/8	7/8	3/4	1	7/8
	4″	5/16	5/16	3/8	5/16	1/2	3/8	5/8	1/2	3/4	5/8	7/8	3/4	1 1/8	7/8
	6″	3/8	5/16	3/8	5/16	5/8	1/2	3/4	5/8	7/8	5/8	1	3/4	1 1/4	7/8
Steel castings	2″	1/4	1/4	1/4	1/4	3/8	3/8	1/2	7/16	5/8	1/2	3/4	5/8	7/8	3/4
	4″	1/4	1/4	1/4	1/4	3/8	3/8	1/2	7/16	5/8	1/2	3/4	5/8	1	3/4
	6″	3/8	1/4	3/8	1/4	1/2	3/8	5/8	1/2	3/4	5/8	7/8	3/4	1 1/8	3/4
Fabricated members satisfactory for speeds up to 10,000 SFPM															
Structural steel	2″	1/8	1/16	3/16	1/8	3/16	3/16	1/4	1/4	5/16	1/4	3/8	5/16	1/2	3/8
	4″	1/8	1/16	3/16	1/8	3/16	3/16	1/4	1/4	5/16	1/4	3/8	5/16	1/2	3/8
	6″	3/16	1/16	1/4	1/8	1/4	3/16	3/8	1/4	3/8	1/4	7/16	5/16	5/8	3/8
Wrought iron	2″	1/8	1/16	3/16	1/8	1/4	3/16	5/16	1/4	3/8	1/4	7/16	5/16	1/2	3/8
	4″	1/8	1/16	1/4	1/8	1/4	3/16	5/16	1/4	3/8	1/4	7/16	5/16	5/8	3/8
	6″	3/16	1/16	1/4	1/8	5/16	3/16	3/8	1/4	7/16	1/4	1/2	5/16	11/16	7/16

501. Material specifications.

Materials used in the construction of hoods shall conform to and be in accordance with the following designated specifications of the American Society for Testing Materials:

(*a*) Gray-iron castings—A 48.
(*b*) Malleable-iron castings—A 47.
(*c*) Steel castings—A 27 (class A).
(*d*) Structural-steel plate—A 9 (excluding specifications for rivet steel).
(*e*) Wrought-iron plate—A 42 (class A).

Note.—Copies of these specifications may be procured at a nominal price from the American Society for Testing Materials, Philadelphia, Pa.

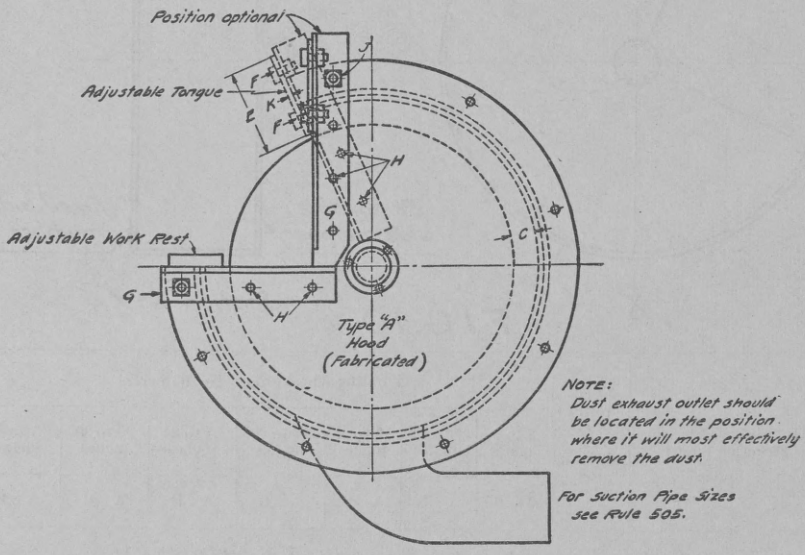

FIG. 11

502. Construction guide.

As a guide for the construction of fabricated hoods of steel plate or wrought iron the following drawings have been prepared. Other types offering equal protection will also be accepted.

The requirements given in columns C, D, and E of this table shall apply also to cast hoods; and in such cases, where the tongue is held by bolts, column F shall also apply.

Diameter of wheel, in inches	C Maximum space between new wheel and hood at periphery, in inches	D Maximum inside width of hood, in inches	E Length of tongue, in inches	F Diameter of bolts for tongue in inches	G Size of angle supports for tongue and rest, in inches	H Diameter of rivets for supports, in inches	J Diameter of end connecting bolts, in inches	K Thickness of tongue, in inches
Under 12	1½	[1] 1½	3½	½	1½x1½x¼	7/16	7/16	¼
12 to 16	1½	[1] 2	5	9/16	2 x2 x5/16	½	½	5/16
17 to 24	1½	[1] 2	6	9/16	2 x2 x½	½	9/16	½
Over 24	1½	[1] 2	7	5/8	2½x2½x½	9/16	5/8	½

[1] Wider than wheel.

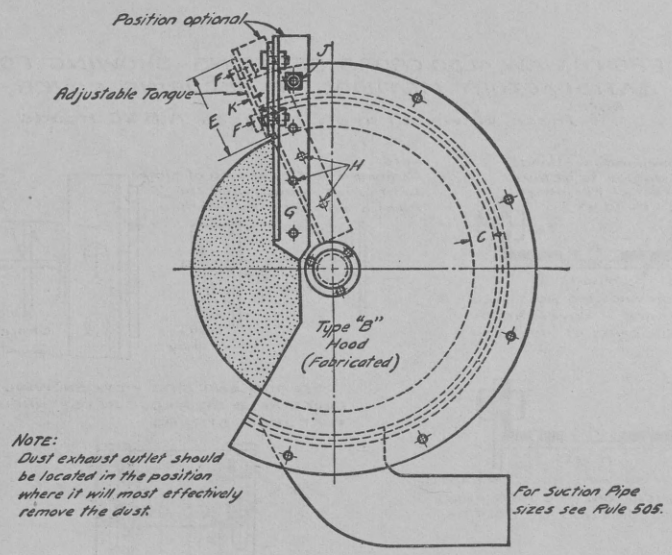

FIG. 12.

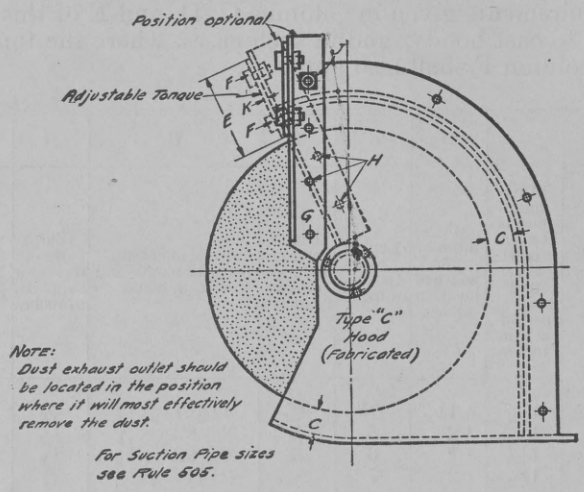

FIG. 13.

FRONT VIEW, ALSO CROSS SECTIONS SHOWING FOUR SATISFACTORY METHODS OF SECURING COVER-B2

NOTE: These views all apply to types A, B & C Hoods

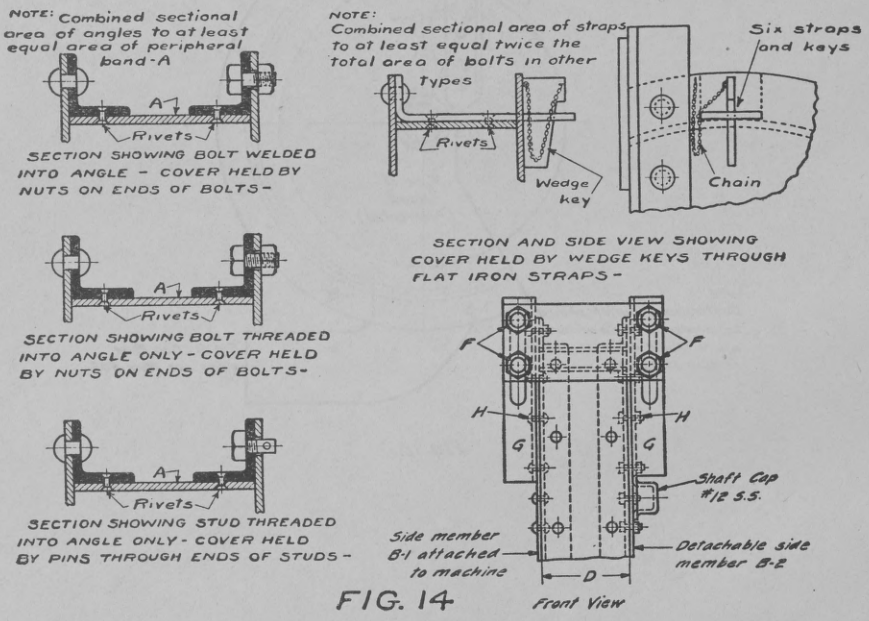

FIG. 14

503. Connection requirements.

Hoods shall be constructed so that the connections between the peripheral and side members, or between parts of a sectional hood, will have a strength in a radial direction at least equal to the strength of the material of which the hoods are constructed.

504. Connecting members (specifications).

MINIMUM SIZES AND SPACING OF RIVETS, BOLTS, AND STUDS FOR CONNECTING PERIPHERAL AND SIDE MEMBERS IN FABRICATED HOODS OF WROUGHT IRON AND STEEL PLATE

Thickness of plates being connected, in inches	For side plate (B–1) attached to machine		For detachable side plate (B–2)	
	Diameter of rivets, in inches	Maximum distance between centers, in inches	Diameter of bolts or studs, in inches	Maximum distance between centers, in inches
1/8 and 1/16	1/16	3	7/16	6
3/16 and 1/16	5/16	3	7/16	6
3/16 and 1/8	5/16	3	7/16	6
3/16 and 3/16	5/16	3	7/16	6
1/4 and 1/8	3/8	4	9/16	8
1/4 and 3/16	3/8	3 1/2	9/16	7
1/4 and 1/4	3/8	3	9/16	6
5/16 and 3/16	9/16	4	13/16	8
5/16 and 1/4	9/16	4	13/16	8
3/8 and 1/4	9/16	4	13/16	8
3/8 and 5/16	9/16	3 1/2	13/16	7
7/16 and 1/4	9/16	3	13/16	6
7/16 and 5/16	9/16	3	13/16	6
1/2 and 5/16	9/16	3	13/16	6
1/2 and 3/8	9/16	3	13/16	6
5/8 and 3/8	5/8	3	7/8	6
11/16 and 7/16	5/8	3	7/8	6

505. Dust exhaust provision.

Hoods on machines used for dry grinding and other operations where dust is produced shall have provision made for connection to an exhaust system.

The size of such connections shall be in conformity with the following specified dimensions:

	Minimum diameter of branch pipe
6 inches or less in diameter	inches 3
7 to 16 inches in diameter	do 4
17 to 24 inches in diameter	do 5
25 to 30 inches in diameter	do 6

A modification of the above requirements will be allowed in the case of narrow wheels used for light work where very little dust is generated and where a smaller pipe will satisfactorily remove it.

The requirements in this paragraph shall not apply to swing frame and portable grinding machines.

SECTION VI. WORK RESTS

60. Construction.

Work rests shall be rigid in construction.

61. Adjustment.

The work rest should be kept adjusted close to the wheel, with a maximum distance of 1-8 inch, to prevent the work from being caught between the wheel and rest and should be securely clamped after each adjustment.

SECTION VII. PROTECTION FOR CUP, CYLINDER, AND SECTIONAL RING WHEELS

70. General requirements.

Cups, cylinders, and sectional ring wheels shall be either protected with hoods, inclosed in protection chucks, or surrounded with protection bands. Not more than one-quarter of the height of such grinding wheels shall protrude beyond the provided protection. Where the thickness of the rim of such wheels is less than 2 inches, the maximum distance which the wheel may protrude beyond the provided protection shall not exceed 1 inch. If the thickness of the rim is 2 inches or more, the wheel may protrude 2 inches beyond the protection, but shall not exceed this amount.

71. Hoods.

Where hoods are used they shall conform to the specifications given in rules 50 to 505, inclusive, in this code.

72. Chucks.

Where the chuck which holds the wheel is the only protection provided, it shall be so designed that the jaws will at all times protect the wheel up to the point specified in rule 70.

73. Bands.

Where protection bands are used, they shall conform to the following specifications:

(*a*) They shall be made of wrought iron or steel plate or other material of equal strength, shall be continuous and bent to conform as closely to the periphery of the wheel as practical. The ends shall either be riveted, bolted, or welded together in such a manner as to leave the inside of the band free from projections.

(*b*) The bands shall be of sufficient width to provide the protection specified in rule 70.

(*r*) The thickness of the band shall be made according to the following table, which also shows the size and spacing for riveted joints. If bolting or welding is used, the strength of the connections shall be at least equal to the riveted joints specified in this table.

MINIMUM THICKNESS, SIZE, AND SPACING OF RIVETS FOR PROTECTION BANDS FOR CUPS, CYLINDERS, AND SECTIONAL RING WHEELS

Size of wheel, in inches	Thickness of band, in inches	Minimum diameter of rivets, in inches	Maximum distance between centers, in inches
Under 8	1/16	3/16	3/4
8 to 24	1/8	1/4	1
25 to 30	1/4	3/8	1 1/4

SECTION VIII. FLANGES

GENERAL

80. General requirements.

All wheels excepting those which are mounted in chucks shall always be run with flanges.

81. Material.

All tapered flanges over 10 inches in diameter shall be of steel or other material of equal strength. All other flanges may be made of cast iron or other material of equal strength.

82. Finish and balance.

Flanges shall be finished all over correct to dimensions and in balance. The requirement for balance does not apply to so-called balancing flanges which are purposely made out of balance.

83. Uniformity of diameter.

Both flanges, whether straight or tapered, in contact with wheel, shall be of the same diameter.

84. Recess.

Each flange, whether straight or tapered, shall be recessed at the center at least one-sixteenth of an inch on the side next to the wheel for a distance as specified in the respective tables of dimensions for straight and tapered flanges.

85. Fit.

The inner flange shall be keyed, screwed, shrunk, or pressed onto the spindle, and the bearing surface shall run true and at right angles with the spindle. The bore in the outer flange should be not more than 0.002 inch larger than the spindle.

86. Straight flange dimensions.

Where protection hoods are used, sizes of straight flanges for straight wheels shall not be less than shown in the following table.

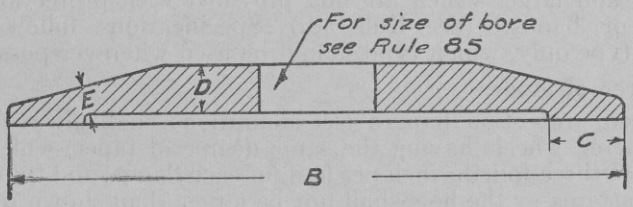

FIG. 15

NOTE.—For wheels larger than 12 inches diameter, if diameter of flange is larger than the "minimum" shown in column B, the radial width of bearing surface may be smaller than the minimum shown in column C, provided the area of the bearing surface is not less than that afforded by a flange of the "minimum" dimensions shown for the size of the wheel in question. In no case, however, shall dimension C be less than half of that shown in the table for the diameter of flange used.

For wheels of 12-inch diameter and smaller the radial width of bearing surface shall not be less than shown in column C opposite the size of the wheel in question.

86. Straight flange dimensions—Continued.

[All dimensions in inches]

A	B	C		D	E
Diameter of wheel	Minimum outside diameter of flanges	Radial width of bearing surface		Minimum thickness of flange at bore	Minimum thickness of flange at edge of recess
		Minimum	Maximum		
1	3/8	1/16	1/8	1/16	1/16
2	3/4	1/8	3/16	1/8	3/32
3	1	1/8	1/4	3/16	3/32
4	1 1/4	3/16	3/8	3/16	1/8
5	1 1/2	3/16	3/8	1/4	1/8
6	2	1/4	1/2	3/8	3/16
8	3	1/4	1/2	3/8	3/16
10	3 1/2	5/16	5/8	3/8	1/4
12	4	5/16	5/8	1/2	5/16
14	4 1/2	3/8	3/4	1/2	5/16
16	5 1/2	1/2	1	1/2	5/16
18	6	1/2	1	5/8	3/8
20	7	5/8	1 1/4	5/8	3/8
22	7 1/2	5/8	1 1/4	5/8	7/16
24	8	3/4	1 1/4	5/8	7/16
26	8 1/2	3/4	1 1/4	5/8	1/2
28	10	7/8	1 1/2	3/4	1/2
30	10	7/8	1 1/2	3/4	5/8
36	12	1	2	7/8	3/4

87. Protection flange requirements.

Protection flanges (see definition) shall always be used with wheels 6 inches and larger which are not provided with protection hoods, chucks, or bands. (See Rule 50.) Specifications follow for the tapered type only, which type should be used wherever possible.

88. Degree of taper.

Tapered protection flanges (see definition) shall always be used with tapered wheels having the same degree of taper, which should be at least three-fourths inch per foot for each flange, and the diameter of the flat area or the hole shall not be larger than shown in column G in Table No. 89. (Page 17.)

89. Tapered flange dimensions.

Where no hoods are used, the dimensions of taper flanges shall not be less than shown in the following table. (Page 17.)

NOTE.—For wheels larger than 12 inches diameter, if diameter of flange is larger than the "minimum" shown in column B, the radial width of bearing surface may be smaller than the minimum shown in column C, provided the area of the bearing surface is not less than that afforded by a flange of the "minimum" dimensions shown for the size of the wheel in question. In no case, however, shall dimension C be less than half of that shown in the table for the diameter of flange used.

For wheels of 12 inches diameter and smaller the radial width of bearing surface shall not be less than shown in column C opposite the size of the wheel in question.

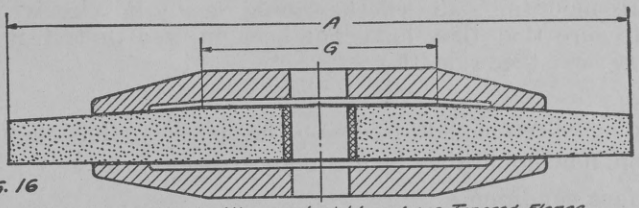

FIG. 16

Single Taper Wheel with one straight and one Tapered Flange

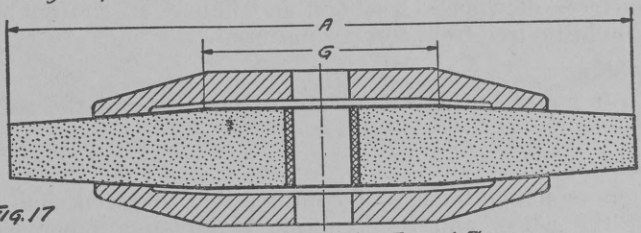

FIG. 17

Double Taper Wheel with two Tapered Flanges

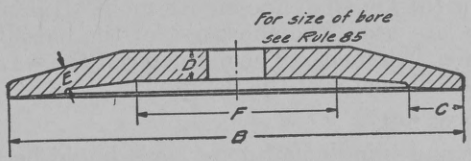

FIG. 18

[All dimensions in inches]

A	B	C		D		E		F	G
Diameter of wheel	Minimum outside diameter of flanges	Radial width of bearing surface		Minimum thickness of flange at bore		Minimum thickness at edge of recess		Maximum flat spot at center of flange	Maximum Diameter of flat spot or hub of wheel
		Minimum	Maximum	For double-taper wheels	For single-taper wheels	For double-taper wheels	For single-taper wheels		
6	3	1/4	1/2	3/8	3/8	3/16	3/16	0	1
8	4	5/16	5/8	3/8	3/8	1/4	1/4	0	1
10	5	1/2	1	1/2	1/2	1/4	1/4	0	2
12	6	1/2	1	5/8	5/8	5/16	5/16	4	4 1/2
14	8	5/8	1 1/4	5/8	3/4	3/8	3/8	4	4 1/2
16	10	3/4	1 1/2	5/8	7/8	3/8	7/16	4	6
18	12	1	2	3/4	1	1/2	9/16	4	6
20	14	1 1/4	2 1/2	3/4	1	1/2	9/16	4	6
22	16	1 3/8	2 3/4	3/4	1 1/8	9/16	5/8	4	6
24	18	1 1/2	3	3/4	1 1/8	9/16	5/8	4	6
26	20	1 1/2	3 1/4	3/4	1 1/8	5/8	11/16	4	6
28	22	1 3/4	3 3/4	7/8	1 1/4	5/8	3/4	4	6
30	24	2	4	7/8	1 1/4	3/4	7/8	4	6
36	28	2	4	1	1 3/8	7/8	1	4	6

NOTE.—Where hoods are used in conjunction with tapered wheels and tapered flanges, the specifications given in rule 86 may be followed.

SECTION IX. MOUNTING

90. Inspection.

Before mounting, all wheels should again be closely inspected to make sure that they have not been injured in transit, storage, or otherwise. (See rule 31.)

91. Fit.

Grinding wheels shall fit freely on the spindles; they should not be forced on, nor should they be too loose. (See rule 46.)

92. Surface condition.

All surfaces of wheels, washers, and flanges in contact with each other should be free from foreign material.

93. Bushing.

The soft metal bushing shall not extend beyond the sides of the wheel.

94. Washers.

Washers or flange facings of compressible material shall be fitted between the wheel and its flanges. If blotting paper is used, it should not be thicker than 0.025 inch. If rubber or leather is used, it should not be thicker than one-eighth inch. If flanges with babbitt or lead facings are used, the thickness of the babbitt or lead should not exceed one-eighth inch. The diameter of the washers shall not be smaller than the diameter of the flanges.

95. Tightening of nut.

When tightening spindle end nuts, care should be taken to tighten same only enough to hold the wheel firmly; otherwise the clamping strain is liable to damage the wheel or associated parts.

SECTION X. SPEED

100. Recommended and maximum speeds.

The speeds shown in column A of the following table should not be exceeded, except on recommendation of the wheel manufacturer, and in no case should speeds shown in column B be exceeded.

NOTE.—Some manufacturers are willing to recommend higher speeds for precision grinding and on rubber bonded wheels.

Wheel classification	A Standard peripheral speed (feet per minute)	B Maximum peripheral speed (feet per minute)
Vitrified and silicate wheels:		
Cup and cylinder wheels when used for rough grinding, on bench, floor, portable machines, etc	4, 500	5, 500
All other vitrified and silicate bonded wheels	5, 000	6, 500

Rubber, shellac, and other organic bonded wheels may sometimes be safely operated at higher speeds. This safe operating speed, however, is dependent upon the grade of the wheel in question. Due to the state of the art, recommendations of the individual wheel manufacturers must be followed.

In general, such wheels in the harder grades may be safely operated at 10,000 surface feet per minute, while the very soft grades shall not be operated at speeds higher than shown in above tables for vitrified wheels.

101. Table of speeds.

REVOLUTIONS PER MINUTE FOR VARIOUS SIZES OF GRINDING WHEELS TO GIVE PERIPHERAL SPEED IN FEET PER MINUTE AS INDICATED

Diameter of wheel in inches	4,000 S. F. M.	4,500 S. F. M.	5,000 S. F. M.	5,500 S. F. M.	6,000 S. F. M.	6,500 S. F. M.
1	15, 279	17, 189	19, 098	21, 008	22, 918	24, 828
2	7, 639	8, 594	9, 549	10, 504	11, 459	12, 414
3	5, 093	5, 729	6, 366	7, 003	7, 639	8, 276
4	3, 820	4, 297	4, 775	5, 252	5, 729	6, 207
5	3, 056	3, 438	3, 820	4, 202	4, 584	4, 966
6	2, 546	2, 865	3, 183	3, 501	3, 820	4, 138
7	2, 183	2, 455	2, 728	3, 001	3, 274	3, 547
8	1, 910	2, 148	2, 387	2, 626	2, 865	3, 103
10	1, 528	1, 719	1, 910	2, 101	2, 292	2, 483
12	1, 273	1, 432	1, 591	1, 751	1, 910	2, 069
14	1, 091	1, 228	1, 364	1, 500	1, 637	1, 773
16	955	1, 074	1, 194	1, 313	1, 432	1, 552
18	849	955	1, 061	1, 167	1, 273	1, 379
20	764	859	955	1, 050	1, 146	1, 241
22	694	781	868	955	1, 042	1, 128
24	637	716	796	875	955	1, 034
26	588	661	734	808	881	955
28	546	614	682	750	818	887
30	509	573	637	700	764	828
32	477	537	597	656	716	776
34	449	505	562	618	674	730
36	424	477	530	583	637	690

NOTE.—"Centrifugal force," which is the force that tends to rupture a given wheel when overspeeding, increases as the square of the velocity of that wheel. For example, the centrifugal force in a wheel running at 5,500 surface feet per minute is 49 per cent greater than in the same wheel running at 4,500 surface feet per minute, although the speed is actually only 22 per cent greater.

102. Speed test.

Machine spindle speeds shall be tested and determined correct for size of wheel to be operated, before the wheel is mounted, and shall never be changed as wheel is reduced in diameter, except by men assigned for such duties.

103. Speed adjustment control.

Where speed of wheel spindle is adjustable, speed adjustment shall be in control of authorized persons only.

SECTION XI. OPERATING RULES AND GENERAL DATA

110. Responsibility.

Competent men should be assigned to the mounting, care, and inspection of grinding wheels and machines.

111. Inspection after breakage.

Whenever a wheel breaks a careful inspection shall be made to make sure that the hood has not been damaged, nor the flanges bent or sprung out of true or out of balance. The spindle and nuts shall also be carefully inspected.

112. Replacing hood.

After mounting a new wheel care should be taken to see that the hood is properly replaced.

113. Starting new wheels.

All new wheels shall be run at full operating speed for at least one minute before applying work, during which time the operator shall stand at one side.

114. Applying work.

Work should not be forced against a cold wheel, but applied gradually, giving the wheel an opportunity to warm and thereby minimize the chance of breakage. This applies to starting work in the morning in cold rooms and to new wheels which have been stored in a cold place.

115. Test for balance.

Wheels should be occasionally tested for balance and rebalanced if necessary.

116. Truing.

Wheels worn out of round shall be trued by a competent man. Wheels out of balance through wear, which can not be balanced by truing or dressing, shall be removed from the machine.

117. Wet grinding wheels.

Wheels used in wet grinding should not be allowed to stand partly immersed in the water. The water-soaked portion may throw the wheel dangerously out of balance.

All wet tool grinders which are not so designed as to provide a constant supply of fresh water shall be thoroughly drained at the end of each day's work and a fresh supply provided just before starting.

118. Side grinding.

Grinding on the flat sides of straight wneels is often hazardous and should not be allowed when the sides of the wheel are appreciably worn thereby or when any considerable or sudden pressure is brought to bear against the sides.

119. Dresser guards.

Wheel dressers, excepting the diamond type, shall be equipped with guards over the tops of the cutters to protect the operator from flying pieces of broken cutters or wheel particles.

1100. Grinding room.

The space about the machine should be kept light, dry, and as free as possible from obstructions.

1102. Lubrication.

Care should be exercised so that the spindle will not become sufficiently heated to damage the wheel.

INDEX

LIST OF BULLETINS OF THE BUREAU OF LABOR STATISTICS

The following is a list of all bulletins of the Bureau of Labor Statistics published since July, 1912, except that in the case of bulletins giving the results of routine surveys of the bureau, only the latest bulletin of any one subject is here listed.

A complete list of the reports and bulletins issued prior to July, 1912, as well as the bulletins published since that date, will be furnished on application. Bulletins marked thus * are out of print.

Wholesale Prices.

No. 284. Index numbers of wholesale prices in the United States and foreign countries. [1921.]
No. 415. Wholesale prices, 1890 to 1925.

Retail Prices and Cost of Living.

*No. 121. Sugar prices, from refiner to consumer. [1913.]
*No. 130. Wheat and flour prices, from farmer to consumer. [1913.]
*No. 164. Butter prices, from producer to consumer. [1914.]
No. 170. Foreign food prices as affected by the war. [1915.]
No. 357. Cost of living in the United States. [1924.]
No. 369. The use of cost-of-living figures in wage adjustments. [1925.]
No. 418. Retail prices, 1890 to 1925.

Wages and Hours of Labor.

*No. 146. Wages and regularity of employment and standardization of piece rates in the dress and waist industry of New York. [1914.]
*No. 147. Wages and regularity of employment in the cloak, suit, and skirt industry. [1914.]
*No. 161. Wages and hours of labor in the clothing and cigar industries, 1911 to 1913.
No. 163. Wages and hours of labor in the building and repairing of steam railroad cars, 1907 to 1913.
*No. 190. Wages and hours of labor in the cotton, woolen, and silk industries, 1907 to 1914.
*No. 204. Street railway employment in the United States. [1917.]
No. 225. Wages and hours of labor in the lumber, millwork, and furniture industries, 1915.
No. 265. Industrial survey in selected industries in the United States, 1919.
No. 297. Wages and hours of labor in the petroleum industry, 1920.
No. 348. Wages and hours of labor in the automobile industry, 1922.
No. 356. Productivity costs in the common-brick industry. [1924.]
No. 358. Wages and hours of labor in the automobile-tire industry, 1923.
No. 360. Time and labor costs in manufacturing 100 pairs of shoes. [1924.]
No. 365. Wages and hours of labor in the paper and pulp industry, 1923.
No. 371. Wages and hous of labor in cotton-goods manufacturing, 1924.
No. 374. Wages and hours of labor in the boot and shoes industry, 1907 to 1924.
No. 376. Wages and hours of labor in the hosiery and underwear industry, 1907 to 1924.
No. 377. Wages and hours of labor in woolen and worsted goods manufacturing, 1924.
No. 381. Wages and hours of labor in the iron and steel industry, 1907 to 1924.
No. 387. Wages and hours of labor in the men's clothing industry, 1911 to 1924.
No. 394. Wages and hours of labor in metalliferous mines, 1924.
No. 407. Labor cost of production and wages and hours in the paper box-board industry, 1925.
No. 412. Wages, hours, and productivity in the pottery industry, 1925.
No. 413. Wages and hours of labor in the lumber industry in the United States, 1925.
No. 431. Union scale of wages and hours of labor, May 15, 1926.
No. 416. Hours and earnings in anthracite and bituminous coal mining, 1922 and 1924.
No. 421. Wages and hours of labor in the slaughtering and meat-packing industry, 1925.
No. 422. Wages and hours of labor in foundries and machine shops, 1925.
No. 435. Wages and hours of labor in the men's clothing industry, 1911 to 1926. (In press.)

Employment and Unemployment.

*No. 109. Statistics of unemployment and the work of employment offices in the United States. [1913.]
No. 172. Unemployment in New York City, N. Y. [1915.]
*No. 183. Regularity of employment in the women's ready-to-wear garment industries. [1915.]
*No. 195. Unemployment in the United States. [1916.]
No. 196. Proceedings of the Employment Managers' Conference held at Minneapolis, Minn., January, 1916.
*No. 202. Proceedings of the conference of Employment Managers' Association of Boston, Mass., held May 10, 1916.
No. 206. The British system of labor exchanges. [1916.]
*No. 227. Proceedings of the Employment Managers' Conference, Philadelphia, Pa., April 2 and 3, 1917.
No. 235. Employment system of the Lake Carriers' Association. [1918.]
No. 241. Public employment offices in the United States. [1918.]
No. 247. Proceedings of Employment Managers' Conference, Rochester, N. Y., May 9–11, 1918.
No. 310. Industrial unemployment: A statistical study of its extent and causes. [1922.]
No. 409. Unemployment in Columbus, Ohio, 1921 to 1925.

Proceedings of Annual Meetings of International Association of Public Employment Services.

No. 192. First, Chicago, December 19 and 20, 1913; Second, Indianapolis, September 24 and 25, 1914; Third, Detroit, July 1 and 2, 1915.
No. 220. Fourth, Buffalo, N. Y., July 20 and 21, 1916.
No. 311. Ninth, Buffalo, N. Y., September 7–9, 1921.
No. 337. Tenth, Washington, D. C., September 11–13, 1922.
No. 355. Eleventh, Toronto, Canada, September 4–7, 1923.
No. 400. Twelfth, Chicago, Ill., May 19–23, 1924.
No. 414. Thirteenth, Rochester, N. Y., September 15–17, 1925.

Women's Insurance and Compensation.

No. 116. Hours, earnings, and duration of employment of wage-earning women in selected industries in the District of Columbia. [1913.]
*No. 117. Prohibition of night work of young persons. [1913.]
*No. 118. Ten-hour maximum working-day for women and young persons. [1913.]
*No. 119. Working hours of women in the pea canneries of Wisconsin. [1913.]
*No. 122. Employment of women in power laundries in Milwaukee. [1913.]
No. 160. Hours, earnings, and conditions of labor of women in Indiana mercantile establishments and garment factories. [1914.]
*No. 167. Minimum-wage legislation in the United States and foreign countries. [1915.]
*No. 175. Summary of the report on conditions of women and child wage earners in the United States. [1915.]
*No. 176. Effect of minimum-wage determinations in Oregon. [1915.]
*No. 180. The boot and shoe industry in Massachusetts as a vocation for women. [1915.]
*No. 182. Unemployment among women in department and other retail stores of Boston, Mass. [1916.]
No. 193. Dressmaking as a trade for women in Massachusetts. [1916.]
No. 215. Industrial experience of trade-school girls in Massachusetts. [1917.]
*No. 217. Effect of workmen's compensation laws in diminishing the necessity of industrial employment of women and children. [1918.]
No. 223. Employment of women and juveniles in Great Britain during the war. [1917.]
No. 253. Women in lead industries. [1919.]

Workmen's Insurance and Compensation (including laws relating thereto).

*No. 101. Care of tuberculous wage earners in Germany. [1912.]
*No. 102. British national insurance act. 1911.
*No. 103. Sickness and accident insurance law of Switzerland. [1912.]
No. 107. Law relating to insurance of salaried employees in Germany. [1913.]
*No. 155. Compensation for accidents to employees of the United States. [1914.]
No. 212. Proceedings of the conference on social insurance called by the International Association of Industrial Accident Boards and Commissions, Washington, D. C., December 5–9, 1916.
No. 243. Workmen's compensation legislation in the United States and foreign countries, 1917 and 1918.
No. 301. Comparison of workmen's compensation insurance and administration. [1922.]
No. 312. National health insurance in Great Britain, 1911 to 1920.
No. 379. Comparison of workmen's compensation laws of the United States as of January 1, 1925.
No. 423. Workmen's compensation legislation of the United States and Canada, as of July 1, 1926.

Proceedings of Annual Meetings of the International Association of Industrial Accident Boards and Commissions.

No. 210. Third, Columbus, Ohio, April 25–28, 1916.
*No. 248. Fourth, Boston, Mass., August 21–25, 1917.
No. 264. Fifth, Madison, Wis., September 24–27, 1918.
*No. 273. Sixth, Toronto, Canada, September 23–26, 1919.
No. 281. Seventh, San Francisco, Calif., September 20–24, 1920.
No. 304. Eighth, Chicago, Ill., September 19–23, 1921.
No. 333. Ninth, Baltimore, Md., October 9–13, 1922.
No. 359. Tenth, St. Paul, Minn., September, 24–26, 1923.
No. 385. Eleventh, Halifax, Nova Scotia, August 26–28, 1924.
No. 395. Index to proceedings, 1914–1924.
No. 406. Twelfth, Salt Lake City, Utah, August 17–20, 1925.
No. 432. Thirteenth, Hartford, Conn., September 14–17, 1926.

Industrial Accidents and Hygiene.

*No. 104. Lead poisoning in potteries, tile works, and porcelain-enameled sanitary-ware factories. [1912.]
No. 120. Hygiene in the painters' trade. [1913.]
*No. 127. Dangers to workers from dust and fumes, and methods of protection. [1913.]
*No. 141. Lead poisoning in the smelting and refining of lead. [1914.]
*No. 157. Industrial accident statistics. [1915.]
*No. 165. Lead poisoning in the manufacture of storage batteries. [1914.]
*No. 179. Industrial poisons used in the rubber industry. [1915.]
No. 188. Report of British department committee on the danger in the use of lead in the painting of buildings. [1916.]
*No. 201. Report of committee on statistics and compensation insurance cost of the International Association of Industrial Accident Boards and Commissions. [1916.]
*No. 207. Causes of death by occupation. [1917.]
*No. 209. Hygiene of the printing trade. [1917.]
No. 219. Industrial poisons used or produced in the manufacture of explosives. [1917.]
No. 221. Hours, fatigue, and health in British munitions factories. [1917.]
No. 230. Industrial efficiency and fatigue in British munitions factories. [1917.]
*No. 231. Mortality from respiratory diseases in dusty trades (inorganic dusts). [1918.]
No. 234. Safety movement in the iron and steel industry, 1907 to 1917.
*No. 236. Effect of the air hammer on the hands of stonecutters. [1918.]
No. 249. Industrial health and efficiency. Final report of British Health of Munition Workers Committee. [1919.]
*No. 251. Preventable death in the cotton-manufacturing industry. [1919.]
No. 256. Accidents and accident prevention in machine building. [1919.]
No. 267. Anthrax as an occupational disease. [1920.]
No. 276. Standardization of industrial accident statistics. [1920.]
No. 280. Industrial poisoning in making coal-tar dyes and dye intermediates. [1921.]
No. 291. Carbon-monoxide poisoning. [1921.]
No. 293. The problem of dust phthisis in the granite-stone industry. [1922.]
No. 298. Causes and prevention of accidents in the iron and steel industry, 1910 to 1919.
No. 306. Occupational hazards and diagnostic signs: A guide to impairments to be looked for in hazardous occupations. [1922.]
No. 339. Statistics of industrial accidents in the United States. [1915.]
No. 392. Survey of hygienic conditions in the printing trades. [1925.]
No. 405. Phosphorus necrosis in the manufacture of fireworks and the preparation of phosphorus. [1926.]
No. 425. Record of industrial accidents in the United States to 1925.
No. 426. Deaths from lead poisoning. [In press.]
No. 427. Health survey in the printing trades, 1922 to 1925. [In press.]
No. 428. Proceedings of the Industrial Accident Prevention Conference, held at Washington, D. C., July 14–16, 1926.

Conciliation and Arbitration (including strikes and lockouts).

*No. 124. Conciliation and arbitration in the building trades of Greater New York. [1913.]
*No. 133. Report of the industrial council of the British Board of Trade in its inquiry into industrial agreements. [1913.]
*No. 139. Michigan copper district strike. [1914.]
No. 144. Industrial court of the cloak, suit, and skirt industry of New York City. [1914.]
No. 145. Conciliation, arbitration, and sanitation in the dress and waist industry of New York City. [1914.]
*No. 191. Collective bargaining in the anthracite coal industry. [1916.]
*No. 198. Collective agreements in the men's clothing industry. [1916.]
No. 233. Operation of the industrial disputes investigation act of Canada. [1918.]
No. 255. Joint industrial councils of Great Britain. [1917.]
No. 283. History of the Shipbuilding Labor Adjustment Board, 1917 to 1919.
No. 287. National War Labor Board: History of its formation, activities, etc. [1921.]
No. 303. Use of Federal power in settlement of railway labor disputes. [1922.]
No. 341. Trade agreement in the silk-ribbon industry of New York City. [1923.]
No. 402. Collective bargaining by actors. [1926.]
No. 419. Trade agreements, 1925.,

Labor Laws of the United States (including decisions of courts relating to labor).

No. 211. Labor laws and their administration in the Pacific States. [1917.]
No. 229. Wage-payment legislation in the United States. [1917.]
No. 285. Minimum-wage legislation in the United States. [1921.]
No. 321. Labor laws that have been declared unconstitutional. [1922].
No. 322. Kansas Court of Industrial Relations. [1923.]
No. 343. Laws providing for bureaus of labor statistics, etc. [1923.]
No. 370. Labor laws of the United States, with decisions of courts relating thereto. [1925.]
No. 403. Labor legislation of 1925.
No. 408. Labor laws relating to payment of wages. [1926.]
No. 417. Decisions of courts and opinions affecting labor, 1925.
No. 434. Labor legislation of 1926.

Foreign Labor Laws.

*No. 142. Administration of labor laws and factory inspection in certain European countries. [1914.]

Vocational and Workers' Education.

*No. 159. Short-unit courses for wage earners, and a factory school experiment. [1915.]
*No. 162. Vocational education survey of Richmond, Va. [1915.]
No. 199. Vocational education survey of Minneapolis, Minn. [1916.]
No. 271. Adult working-class education in Great Britain and the United States. [1920.]

Safety Codes.

No. 331. Code of lighting factories, mills, and other work places.
No. 336. Safety code for the protection of industrial workers in foundries.
No. 350. Specifications of laboratory tests for approval of electric head lighting devices for motor vehicles.
No. 351. Safety code for the construction, care, and use of ladders.
No. 364. Safety code for mechanical power-transmission apparatus.
No. 375. Safety code for laundry machinery and operation.
No. 378. Safety code for woodworking plants.
No. 382. Code of lighting school buildings.
No. 410. Safety code for paper and pulp mills.
No. 430. Safety code for power presses and foot and hand presses.
No. 433. Safety codes for the prevention of dust explosions.

Industrial Relations and Labor Conditions.

No. 237. Industrial unrest in Great Britain. [1917.]
No. 340. Chinese migration, with special reference to labor conditions. [1923.]
No. 349. Industrial relations in the West Coast lumber industry. [1923.]
No. 361. Labor relations in the Fairmont (W. Va.) bituminous coal field. [1924.]
No. 380. Postwar labor conditions in Germany. [1925.]
No. 383. Works council movement in Germany. [1925.]
No. 384. Labor conditions in the shoe industry in Massachusetts, 1920 to 1924.
No. 399. Labor relations in the lace and lace-curtain industries in the United States. [1925.]

Welfare Work.

*No. 123. Employers' welfare work. [1923.]
No. 222. Welfare work in British munition factories. [1917.]
*No. 250. Welfare work for employees in industrial establishments in the United States. [1919.]

Cooperation.

No. 313. Consumers' cooperative socities in the United States in 1920.
No. 314. Cooperative credit socities in America and in foreign countries. [1922.]

Housing.

*No. 158. Government aid to home owning and housing of working people in foreign countries. [1914.]
No. 263. Housing by employers in the United States. [1920.]
No. 295. Building operations in representative cities in 1920.
No. 424. Building permits in the principal cities of the United States, 1925.

Proceedings of Annual Conventions of the Association of Governmental Labor Officials of the United States and Canada.

No. 266. Seventh, Seattle, Wash., July 12–15, 1920.
No. 307. Eighth, New Orleans, La., May 2–6, 1921.
*No. 323. Ninth, Harrisburg, Pa., May 22–26, 1922.
No. 352. Tenth, Richmond, Va., May 1–4, 1923.
No. 389. Eleventh, Chicago, Ill., May 19–23, 1924.
No. 411. Twelfth, Salt Lake City, Utah, August 13–15, 1925.
No. 429. Thirteenth, Columbus, Ohio, June 7–10, 1926.

Miscellaneous Series.

*No. 174. Subject index of the publications of the United States Bureau of Labor Statistics up to May 1, 1915.
No. 208. Profit sharing in the United States. [1916.]
No. 242. Food situation in central Europe, 1917.
No. 254. International labor legislation and the society of nations. [1919.]
No. 268. Historical survey of international action affecting labor. [1920.]
No. 282. Mutual relief associations among Government employees in Washington, D. C. [1921.]
No. 299. Personnel research agencies. A guide to organized research in employment, management, industrial relations, training, and working conditions. [1921.]
No. 319. The Bureau of Labor Statistics: Its history, activities, and organization. [1922.]
No. 326. Methods of procuring and computing statistical information of the Bureau of Labor Statistics. [1923.]
No. 342. International Seaman's Union of America: A study of its history and problems. [1923.]
No. 346. Humanity in government. [1923.]
No. 372. Convict labor in 1923.
No. 386. The cost of American almshouses. [1925.]
No. 398. Growth of legal-aid work in the United States. [1926.]
No. 401. Family allowances in foreign countries. [1926.]
No. 420. Handbook of American trade-unions. [1926.]